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THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Stormwater Collection, Treatment, Recycling and Reuse in a Shipyard

U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER

in cooperation with
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San Diego, California

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Center for Advanced Ship Repair and Maintenance (CASRM)
Old Dominion University

Final Report

STORMWATER COLLECTION, TREATMENT, RECYCLING AND REUSE IN A SHIPYARD

NSRP PROJECT N1-96-07

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December 31, 1998

TABLE OF CONTENTS

I. Introduction: Development of Stormwater Regulations

Stormwater has historically been considered a problem of "quantity" to be addressed by channeling and diverting excess quantities of rainfall away from residential and industrial activities. The impact to receiving waters was thought to be insignificant because the rain water would eventually find its way to the rivers and streams in the watershed in which the rain fell regardless of alterations in the natural landscape caused by human activities. Increasingly it has become apparent that stormwater can become contaminated when it comes in contact with routine residential, municipal, commercial, and industrial activities. The evidence of this association has increased in recent years and relationships between land use/activities and alterations in the chemical characteristics of stormwater runoff have been frequently reported. Agricultural activities, land development, and general urbanization have all been shown to influence the chemical composition of stormwater runoff relative to natural conditions.

Major problems with regard to stormwater quality occur when the natural or altered flow paths of stormwater runoff in a watershed cause the mobilization and transport of constituents to receiving water systems at concentrations which cause toxic or adverse health effects to aquatic organisms or humans exposed to these waters. It is known that both the stormwater flow path and the contact time with potential contaminants strongly regulates stormwater quality. Activities can occur in a watershed that generate or handle large quantities of a particular contaminant but pose no threat to receiving waters due to the lack of contact with precipitation or stormwater runoff (e.g. contaminants that are housed within enclosed buildings). Alternatively, activities where a small amount of a particular constituent is handled or generated can be more important if stormwater runoff contacts this material and it is easily mobilized to receiving water systems.

The US Environmental Protection Agency (USEPA) has implemented regulatory programs designed to minimize the potential for stormwater to become contaminated and to reduce the potential for contaminated stormwater to enter rivers, estuaries and oceans. These efforts are apparent through requirements to hold an NPDES permit for point source discharges of collected stormwater and recent requirements to develop and implement stormwater management plans (i.e stormwater pollution prevention plans, SWP_3). Research efforts and land management efforts of the USEPA, the US Department of Agriculture, the US Department of the Interior, and many state and local environmental regulatory agencies all signify the importance with which regulatory agencies view stormwater runoff. The development and implementation of best management practices (BMPs) that frequently influence the generation of surface runoff and the flow path of runoff before or after potential contact with contaminants signify the importance of the relationship between flow path and the potential for contaminant transport to receiving water systems.

The majority of shipbuilding and repair activities occur in the immediate vicinty of rivers, bays and estuaries, where the period of time between the generation of runoff and entry into a receiving system is short and the potential for stormwater to become contaminated at these sites has been perceived to be high. The large number of activities at these facilities that occur in the open, seem to be a primary target of recently promulgated and anticipated future regulatory programs. In addition, many industrial manufacturing and processing-type activities normally conducted in enclosed spaces, could have the potential for influencing stormwater composition if raw or waste products are stored in open areas exposed to precipitation or runoff.

Application and removal of paints from the hulls of ships is one area that has received considerable regulatory attention. When this activity occurs in a drydock, the potential for mobilization and transport of materials that accumulate on the drydock floor is particularly acute since there is no rainwater infiltration (as might occur for a ship on a marine rail system) due to the impervious nature of the drydock floor. If the drydock is a floating drydock, transport to the receiving water can be particularly quick since flow occurs across the deck of the ship and discharges directly to the surface water that completely surrounds a drydock. USEPA and State agencies have been requiring certain BMP procedures to intercept and contain transport of large particulate matter from drydock surfaces and are considering more strenuous collection and treatment options (see Section IV). Permanent drydocks that generally collect storm runoff through collection systems in the drydock floor and discharge this water by pumping to the adjacent surface water have also come under regulatory review and in some situations have been required to treat these waters before discharge.

The impact to shipyards through costly engineering controls and changes in traditional business practices to meet regulatory objectives associated with stormwater control could be excessive if clear relationships between shipyard activities, flow paths, and contaminant transport are not used to guide future regulatory requirements and shipyard responses to any imposed regulations. Therefore, it is important to understand the relationships between various shipyard activities and how these influence the chemical composition of stormwater that originates from shipyards so that stormwater management efforts can include the most effective and cost efficient techniques to meet stormwater quality objectives.

II. Objectives

The primary objectives of this study were to:

1) document and summarize the present and future regulatory programs concerning stormwater management and discharge limits;
2) identify shipyard activities which could contaminate stormwater and what current practices at shipyards to minimize or eliminate the contact between stormwater and the activities are being implemented;
3) rank stormwater management and engineering controls available to shipyards based on cost-effectiveness and scientifically and environmentally sound principles;
4) provide a guide for shipyards to use in selecting the most appropriate stormwater management practices based on the individual site and conditions; and

III. Study Approach to Meeting Stated Objectives

The stormwater study can be viewed in terms of three major objectives dealing with regulations, sources of stormwater contamination and description of the available management options, and review of treatment options for controlling stormwater contaminants relative to efforts to mitigate their mobilization into stormwater. The three objectives are listed below as well as the efforts that

supported one or more of the objectives.

Objective 1:

A major objective of this project was to assess the current state of regulatory affairs with regard to stormwater management and control and to appraise what future regulatory actions might be promulgated based on policy and regulations that are currently in draft stages. A number of sources of information were used including: "regulatory" documents (i.e. documents where regulations are specifically being addressed by state or federal agencies or advisory committees); non-regulatory, policy documents (state or federal documents that discuss various water quality issues that can be used to infer where stormwater policy may be headed); interpretive documents which are typically articles in professional publications and describe the current regulatory situation or reflect a point of view of the author of where regulations are likely headed. Personal contacts with persons involved at the State or Federal regulatory process level were also used as resources. Some of the sources utilized are listed below:

- Federal Register (accessible at http://www.epa.gov/fedrgstr/EPA-WATER)
- Urban Wet Weather Flows Federal Advisory (FACA) Committee meeting minutes and other documents
- Phase II Stormwater FACA Sub-Committee meeting minutes, draft documents, response to comments, telephone conference calls, etc.
- Federal Advisory Committee on the Total Maximum Daily Load (TMDL): meeting minutes, Draft Final Report (July 1998), and other documents
- Executive Memorandums
- Clean Water Action Plan (February 1998)
- Thompson's Stormwater Permit Manual Bulletin
- Water and wastewater trade journals
- Envirosense Newsletter (US Navy) (http://es.epa.gov/program/p2dept/defense/navy/navy-fs2.html)
- Marine Environmental Update (http://environ.nosc.mil/Programs/MESO/Newsltr)
- USEPA Documents: NPDES Permit Writers Manual (1996), USEPA Web Pages (PIPES, Region 6 Stormwater; "Wastewater New" from the Office of Wastewater Management, State Regulatory Web pages)
- Personal contacts with state and federal regulators and UWWF FACA member

Discharge limits (maximum contaminant level, MCL) and the criteria that state or USEPA regional offices use to establish the MCL for specific chemical constituents in stormwater will also be examined in this part of the study. Included in this effort will be an assessment of the procedures (if any) that the regulatory authority allows in defining a mixing zone for stormwater discharges.

Objective 2:

Another major objective of this study was to identify the source of potential stormwater contaminants at shipyards and identify the source and mechanism for mobilization into stormwater. This information was collected through direct contacts with shipyard personnel during visitations at selected shipyards across the nation and from survey results. Various activities that occur at shipyards are characterized in the report with regard to their potential to contribute to contaminant mobilization into stormwater. In addition, the measures (i.e. best management practices, BMPs) that shipyards have developed were examined to minimize stormwater contamination and are reported here. These measures for most shipyards have been incorporated into the stormwater management or stormwater pollution prevention plan (SP_3) that is required under their NPDES or equivalent state permit. Lastly, the degree of recycle and reuse of stormwater in shipyards was examined through survey and shipyard visits.

Objective 3:

A third component of the study was to examine the stormwater management options including the effectiveness and cost of various BMPs and stormwater treatment techniques. This effort was conducted using trade journals, literature obtained from shipyards, and through computer-based searches of the internet.

Development and Execution of the Shipyard Survey:

An important component of the stormwater study was the information received from shipyard environmental personnel on stormwater permitting/regulatory requirements, stormwater management initiatives, stormwater treatment, and shipyard industrial activities. In the fall and winter of 1997-98 a shipyard stormwater survey was developed and sent to environmental personnel (J. Boisseau and T. Beacham) at two shipyards in the mid-Atlantic region for comments concerning the format, information requested, length, and any other items that were related. The survey was revised following their input and then prepared for distribution. Mr. Larry Mizelle directed distribution of the surveys and followed up with phone calls to many of the shipyards. The survey was distributed in early March 1998 and received back by late April. The results have been summarized by individual question and are presented later in the report.

Shipyard Visitations :

Visitations to ten shipyards were conducted during the study to collect shipyard-specific stormwater information. Shipyards were selected to represent the northeast, mid-Atlantic, southeast and Gulf Coast, southern California, and the Pacific northwest. The shipyards visited were all ones that had participated in the shipyard survey and the visits allowed confirmation of the survey information and expansion on some of the areas not possible within the survey; see Appendix A for primary notes collected during visits. The majority of the shipyards were visited in the late summer of 1998. The shipyards and the primary contact persons during the visit are indicated Table 1.

Table 1. Shipyard Site Visits Completed

Shipyard	Primary Contact(s)
Atlantic Marine - Jacksonville	Wayne Holt
Avondale	Steve Lacoste, Maria Blanchard
Atlantic Marine – Mobile	Julian Bingham
NASSCO	Ron Miller
Southwest Marine	Tina Best, Lena Best
Cascade General - Portland	Bob Coates
Todd Pacific Shipyards	Richard Stanford, Allen Rainsberger
Puget Sound Naval Shipyard	Bruce Beckwith, Steve Swanson
Bath Iron Works	Vince Dickinson
NORSHIPCO	Tom Beacham

In addition to confirmation and expansion of the survey, other objectives of the site visits were to assess the performance and the environment in which any stormwater controls or management plans that are utilized work; to discuss the reasons and circumstances for implementation of these specific plans; to examine common characteristics of shipyard activities and sources of contaminants. Data on regional differences in, climate, rainfall, shipyard operations, regulatory implementation, and receiving surface waters was also obtained and used to determine how these factors influence the generation and conveyance of rainfall from shipyard facilities and the techniques to control its movement.

IV. Stormwater Regulations

Development of Stormwater Regulations

The information below is a summary of the federal regulations developed over the past 25+ years that have bearing on stormwater discharges and permitting. A more detailed discussion of the regulations, their development, and interpretation can be found in Moffet et al. (1996).[1]

Stormwater regulations that are presently in existence or currently being developed are essentially progeny of the 1972 Federal Water Pollution Control Act amendments. This legislation, commonly referred to as the Clean Water Act (CWA), initiated many changes in the management of water resources and was directed toward the rehabilitation and protection of the nation's waterways. This legislation specifically prohibited the discharge of any pollutant to waters of the United States from a point source unless the discharge was authorized by a National Pollutant Discharge Elimination System (NPDES) permit (Section 402 of the CWA). The focus of this permit was to reduce pollutant inputs to surface waters from industrial process wastewater and from municipal sewage treatment plants. In 1973, EPA promulgated it first regulations for stormwater in the form of an exemption stating that stormwater runoff contaminated by industrial or commercial activities were not required to meet the CWA regulations. This exemption was challenged by the National Resources Defense Council (NRDC) and subsequently overturned. In 1976 EPA issued a rule that covered all stormwater discharges excluding only rural runoff uncontaminated by industry or commercial activities. Subsequent rules in 1980 and 1985 were controversial and stimulated many lawsuits from industry trade associations.

In 1987, the United States Congress amended the CWA (this legislation is often referred to as the Water Quality Act of 1987) to require the USEPA to establish phased NPDES requirements for stormwater discharges from industrial activities, large municipal systems, and any discharge deemed to violate a water quality standard. This change was in recognition of the potentially important role that stormwater discharges could have on receiving surface waters. The WQA also established an antibacksliding requirement that that would not allow an existing permit to be modified or reissued with less stringent effluent limitations, standards, or conditions than those already imposed.

The 1987 WQA also clarified that industrial stormwater permits must address the same requirements as NPDES process wastewater permits and include best available technology (BAT) or best practicable technology (BPT) or if necessary water-quality-based standards. These requirements are generally met with effluent numeric limits. However, EPA took a different approach and determined in most cases that implementation of a site-specific, stormwater pollution prevention plan (SWP_3) was adequate to satisfy the BAT/BPT criteria. This situation has been identified as an interim approach (see policy published on August 26, 1996, 61 FR 43761)
for incorporating water quality-based effluent limitations into stormwater permits while monitoring information is collected to better determine what appropriate effluent limits will be in the future.

[1] *Overview of Stormwater Regulations*, P. E. Moffa, N.J. Cabral, and L. Ford. In "The Control and Treatment of Industrial and Municipal Stormwater," P.E. Moffa, Ed. Van Nostrand Reinhold, 1996.

To promulgate the directive within the WQA, the EPA published the first requirements for permitting stormwater discharges on November 16, 1990 (55 FR 47990) in the stormwater permit application rule. The focus of the permit was to provide a mechanism for monitoring the discharge of pollutants from these sources and to establish appropriate controls. The sources that are covered under this permit include stormwater discharges associated with industrial activities and municipalities with a population of 100,000 or more. This regulation in later years has been referred to as the Phase I stormwater regulation and organizations that are covered under these requirements are referred to as Phase I dischargers or sources. Shipyards were explicitly included as a Phase I industrial activity as noted in 40 CFR 122.26(b)(14) subpart ii under the Standard Industrial Classification (SIC) 373 – Ship and Boat Building and Repairing.

Federal stormwater requirements since the "Phase I" rule issued by EPA have largely been directed toward the development of stormwater permits and the development of a phase II rule to cover sectors not covered in phase I. (The Phase II rule will not be elaborated on here but will be discussed is a subsequent section of this report.) An exception was the final rule promulgated on August 7, 1995 EPA (60 FR 40230) rule that established a two-tiered program for regulating small dischargers. Under this rule, dischargers deemed to have significant impact on water quality were required to obtain a permit within 180 days while the remaining dischargers have until August 2, 2001 to obtain a permit.

On September 29, 1995 EPA published the final NPDES Multi-Sector General Permits (MSGP) for stormwater discharges associated with industrial activity (60 FR 50804) which includes the requirement to develop and implement a stormwater pollution prevention plan (SWP_3). This permit was intended to replace the baseline general/individual permit. The intent of this new permit was to give flexibility to industry to choose the most appropriate method to control stormwater contaminant releases from their facilities. This has been described as a revision of the previous "one-size-fits-all" approach and instead relies on industry to determine the source of contaminants and to implement new practices to minimize their mobilization into stormwater. Under this permit, a permittee who shows reduction in the release of pollutants in stormwater can have their monitoring requirements reduced.

While EPA has led the development of regulations concerning stormwater and the development of permits, states have played an important role in both permitting and the implementation of the regulations. This is particularly true since 42 states have been delegated the authority to manage the NPDES program within their borders. While states that have NPDES delegation from EPA are required by statute to satisfy federal rules and regulations, they have the flexibility to devise permitting programs in any manner as long as it meets the water quality standards set out in the CWA and additional requirements established in successor legislation. While states have to meet federal requirements, they are free to set standard more stringent that federal requirements. In addition, states may develop different types of permits with different requirements than the "national" permits that the EPA develops for the states where it has NPDES regulatory authority. While states have this freedom, most have followed closely the federal requirements and issue permits similar in scope to those developed by the EPA. Some states and local authorities have adopted additional requirements that relate to site development and erosion control and runoff attenuation (i.e. no change in runoff hydrograph between pre- and post-development).

Currently Developing Federal Regulations Directed Toward Stormwater

There are a number of factors that potentially will influence stormwater permitting and management in the future. These encompass changes that may occur directly in the stormwater program regulations (or their implementation) or indirectly through other regulations that will have the indirect effect of controlling the amount of quality of stormwater input to receiving systems. These items are discussed in the subsequent section.

The section under this heading details the process that has led to the development of the Draft Stage II Rule; the only pending rule that directly affects stormwater. The following statement copied directly from the EPA Urban Wet Weather Flows Policy Dialogue Internet Site illustrates why the activities of the subcommittee named within, were followed most closely during this study.

> *In 1995, EPA established the Urban Wet Weather Flows Federal Advisory Committee to involve representative stakeholders in addressing the environmental and health problems related to urban wet weather discharges. The Committee provides a forum to identify and discuss a range of cross-cutting issues associated with wet weather discharges including: improvements to the Storm Water Phase I program, the coordination of wet weather discharge control efforts on a watershed basis, and water quality standards in a wet weather context. The Committee is composed of stakeholders representing municipalities, industry, commercial interests, environmental groups, States/Tribes, and technical organizations. The Committee's discussions are intended to build on the successful CSO Policy Dialogue, which resulted in the development of the CSO Control Policy.*
>
> *To foster an efficient discussion of issues, two Subcommittees have been established under the Committee. The Storm Water Phase II Subcommittee will provide recommendations on how to develop a Storm Water Phase II program. The Sanitary Sewer Overflows Subcommittee is working to develop a framework for addressing the human health and environmental impacts of SSOs.*

From this statement it can be seen that the development of new regulations under stormwater issues dealing with shipyards and shipbuilding has since 1995 been under the purview of the Stormwater Phase II Subcommittee. Consequently as noted above, it was the actions of this committee and its members that were followed over the past two years of this study. Committee membership totaled 32 (not counting alternates) with 10 representing industry trade organizations. The remainder of the committee was comprised primarily of regulators and representatives of what could be collectively referred to as environmental groups.

The *proposed* stormwater phase II rule was published in the Federal Register (63 FR) on January 9, 1998 and was open for public comment until April 9, 1998. Comments received during that period are currently being addressed by EPA. A deadline for issuance of the final regulation has been set as March 1, 1999 with the executive branch stating that this deadline will be met.

In support of the proposed rule published in January, EPA developed a Fact Sheet which is excerpted below. All excerpted information is printed in italics.

PROPOSED NPDES STORM WATER REGULATIONS FOR PHASE II AND THE "NO EXPOSURE" INCENTIVE FOR PHASE I

- *EPA developed its NPDES proposed Storm Water Phase II regulations with valuable input from representatives from a cross section of interested stakeholders including members of a subcommittee under the Urban Wet Weather Federal Advisory Committee, including State, Tribal, municipal, industrial, environmental representatives, as well as small entity representatives under the Small Business Regulatory Enforcement Fairness Act (SBREFA). This proposal fulfills a major part of the commitment by the Vice President when announcing the Clean Action Water Plan in October of 1997.*

- *When finalized, this rule will supersede the August 7, 1995 storm water regulation (60 FR 40230).*

<u>The proposed rule:</u>

- *Regulates sources of storm water that cause water quality impairments.*

- *Designates two classes of facilities for automatic coverage on a nationwide basis under the NPDES program:*

- *small municipal separate storm sewer systems located in urbanized areas.*

- *pollutants include sediment, floatable, oil and grease, as well as other pollutants from illicit discharges.*

- *about 3,500 municipalities will be included in the program.*

- *construction activities that disturb equal to or greater than one and less than five acres of land.*

- *pollutants include sediments and erosion from these sites.*

- *about 110,000 sites a year will be included in the program.*

- *Allows for designation on a case-by-case basis of other facilities and industrial and construction activities, as well as small municipal separate storm sewer systems outside urbanized areas.*

- *Avoids duplication by allowing NPDES permits to be written so that compliance with a qualifying*

State, Tribal, or local program constitutes compliance with NPDES requirements.

- *Expands eligibility for relief from NPDES storm water Phase I permitting requirements through a conditional exemption for approximately 70,000 facilities that provide a certification of no exposure of industrial activities to storm water.*

- *Attempts to facilitate and promote watershed planning as a framework for implementing storm water management programs.*

- *Seeks opportunities to integrate the proposed requirements with existing Phase I requirements, as well as existing local, State, and Tribal requirements, thus facilitating a "seamless" unified storm water program.*

Also included within the EPA Fact Sheet for the Phase II Stormwater regulation is a section that addresses industrial sources of stormwater.

INDUSTRIAL/COMMERCIAL FACILITIES

Proposed Applicability

- *Any remaining unregulated discharge composed entirely of storm water may continue to be designated for regulation on a case-by-case basis as a "storm water discharge associated with other activity."*

- *Storm water discharges associated with industrial activity, other than from power plants, airports, and uncontrolled sanitary landfills, that are owned or operated by municipalities of less than 100,000 people were previously exempted under The Intermodal Surface Transportation and Efficiency Act of 1991 (ISTEA).*

- *Any storm water discharge associated with industrial activity, other than those associated with construction activities or sources individually designated as eligible for the conditional exemption for "no exposure" of industrial activities and materials to storm water.*

Proposed Requirements

- *The NPDES permitting authority's existing designation authority as well as the petition provisions are retained. Designated sources would be required to obtain NPDES permit coverage.*

- *The existing deadline to obtain a permit for facilities previously exempted under ISTEA (August 7, 2001) would be maintained.*

- *Eligible storm water discharges associated with industrial activity regulated under the NPDES storm water program could be relieved of permitting requirements if they certify once every five years that they have "no exposure" of materials to storm water. The operator would also be required to certify that they have not taken, and will not take, any actions that would interfere with the attainment or maintenance of water quality standards, including designated uses. The NPDES permitting authority would still retain the authority to require a facility to apply for an individual or general permit if found to be causing or contributing to the violation of, or interfering with the attainment of, a water quality standard, including designated uses.*

Proposed Time Frames

- *Sources designated under the definition of "storm water discharges associated with other activity" would be required to submit an NPDES permit application by 3 years and 90 days from the date of publication of the final rule or as otherwise determined by the NPDES permitting authority.*

- *Sources individually designated under Phase I would be required to submit an NPDES permit application within 180 days of notice from the NPDES permitting authority. ISTEA sources must submit an NPDES permit application by 8/7/01 (existing deadline).*

- *Sources claiming no exposure of industrial activities and materials to storm water would be required to submit the No Exposure Certification every 5 years to the NPDES permitting authority.*

- *Sources who have certified to no exposure would be required to comply immediately with all the requirements of the storm water program if there is a change in circumstances that causes exposure of industrial activities or materials to storm water.*

The phase II regulation was developed in large part (but not solely) to "capture" dischargers of stormwater who did not fall under the previous phase I rule. These dischargers include:

- Municipal, separate, storm sewer systems (MS_4) serving populations < 100,000.
- Discharges from smaller construction sites. Formerly the discharge permits were needed for sites 5 acres or greater. The proposed limit is now sites 1 acre or greater.
- Retail, commercial, and residential activities.

Since ship repairers and shipyards are covered as an industry under Phase I these changes do not appear to have much impact on stormwater management at shipyards. However, indirectly there could be consequences if a shipyard discharges any portion of its stormwater (possibly through unknown connections) to a small municipal system. If the small MS_4 is found in the future to violate permit requirements, recourse might be to limit or prohibit shipyard discharges to the MS_4. The number of shipyards that discharge stormwater to an MS_4 is not known, but it is clear based on the survey and visits and discussions with shipyard personnel around the country that stormwater does discharge at many shipyards to either a municipal stormwater or wastewater collection system. Older shipyards may

be more susceptible to this occurrence as a number of the storm sewers and connections are not well documented. Some shipyards receive stormwater into their stormwater system from non-shipyard sources and this stormwater discharges under the shipyard's permit.

As noted above, the Phase II regulation proposes a change to the size of land area disturbed by construction that would require a stormwater permit. Presently sites five acres or greater in size require a stormwater permit. The proposal, if adopted, would lower the construction land area for which a permit would be needed to one-acre sites or greater. Land-disturbing construction activities at shipyards exceeding one acre would be covered by this requirement if it remains intact as proposed. The issue of reducing the construction land area that would require a permit was one that reached a compromise in committee. EPA had proposed construction land disturbances 0.5 acre and greater require a stormwater permit while environmental groups thought the cutoff should be lower in certain areas (i.e. site specific).[2] Industrial representatives voiced concern over both of these proposals and were particularly concerned that burdensome requirements would be imposed on them even if they were only conducting simple repair projects at their facilities. It was pointed out that repair projects at industrial sites would already be covered by an SWP_3 under the Phase I requirements. As seen in the final draft proposal, one acre was adopted as the minimum construction land area that would require a stormwater permit. The expected impact on shipyards should be minimal and govern only new construction of buildings and roads.

Possibly the most significant development for a number of industries is the development of the no exposure incentive. This incentive was developed to allow industries that conducted "industrial activity" (including storage of raw products and waste materials) in enclosed areas that they could be relieved of regulatory monitoring burden for stormwater discharges. In a memorandum from the EPA Office of Water the following description of the " 'No Exposure' Incentive for Phase I" [Facilities] is described below.

> *EPA is proposing to conditionally exclude from the NPDES storm water program, Phase I facilities that have no exposure of industrial activities, such as industrial products, processes, or raw materials, to storm water, thereby reducing application of the program to many industrial activities currently covered by the program that have no industrial storm water discharges. EPA estimates that at least 70,000 facilities will be able to take advantage of this provision by removing these various activities form the potential to be exposed to storm water .*[3]

Future Directions in Regulating Stormwater

There are a number of issues that are continuing to be debated and are likely to change the way stormwater is regulated. Some of these issues are scientific-based (e.g. water quality standards, sediment standards, toxicity, receiving water dilution) while others deal with implementation of existing regulations (e.g. "watershed approach," effluent trading, developing TMDLs, development of numeric

[2] Discussion of this topic can be seen in the Urban Wet Weather FACA Meeting, Meeting Summary, November 18-19, 1996.

[3] USEPA Memorandum, Office of Water (MC-4201), December 15, 1997.

stormwater effluent standards). Future direction in stormwater requirements through NPDES permitting will primarily emanate from EPA. These changes will largely be driven by compliance with the original CWA under which the NPDES permit system was developed. Additional changes in stormwater management may be driven indirectly by other requirements dealing with surface water and sediment quality. What these changes may be and how they might evolve will be addressed below. The suppositions presented in this report are based on discussions seen in the Urban Wet Weather Flows FACA Committee, in discussions with regulators, and in reports and memoranda dealing with these issues.[4] Some of the regulatory and non-regulatory factors that may influence the stormwater program and operations at shipyards include:

- Development of TMDLs
- Development and revision of surface water quality standards
- Development of numeric effluent limits for stormwater
- Development of sediment quality standards
- Reclassification of the designated beneficial use of water bodies
- Civil law suits
- Development of regulatory controls for agriculture
- Control of nonpoint source (unregulated) stormwater

Currently, the EPA stormwater quality management program requires that stormwater pollution be controlled to the maximum extent practicable (MEP) through the use of best management practices (BMPs). The interpretation of MEP is one that has been debated within the UWWF FACA committee and may change if Congress specifies through legislation a less interpretable and more definitive definition.[5] The EPA or state regulatory agencies in the future may also reinterpret its meaning as well as its position on BAT/BPT and require greater stormwater controls than presently required. As noted previously in the report, EPA is currently as an interim policy, interpreting BAT/BPT to be implementation of an approved SWP_3. This interim policy may be followed by a combination of limits and controls on stormwater discharge. However, the Phase II regulations continue to recognize implementation of appropriate BMPs as compliance with the MEP and CWA.[5]

Within most of the EPA literature and FACA committee documents dealing with surface water quality and stormwater there is a common thread that the "watershed approach" will be the future direction for regulating stormwater and its impact on water quality. This approach relies on an abundance of good water quality data in the receiving water and well-characterized inputs (both PS and NPS) to the receiving water. This information does not exist for many, if not most, of the waters that are identified and reported to Congress as impaired under the CWA (303(d)-listed waters). This information is also the information that is required to develop TMDLs that EPA has identified as a

[4] "The Use of Education and Outreach to Improve Compliance" Draft Issue Paper, USEPA, July 25, 1997; "Nonpoint Sources: Picking up the Pace-EPA's Draft Proposal Strategy for Strengthening Nonpoint Source Management, 1997; "Clean Water Action Plan" February 17, 1998; "Draft TMDL FACA Report," July 28, 1998.

[5] Discussion of MEP and the decision not to include an explicit definition in the Phase II rule can be seen in the "Stakeholders and EPA Internal Workgroup Summary of Written Comments on Phase II Draft Proposed Preamble (2/14/97) and Rule (2/13/97) Language and EPA Responses," September 10, 1997.

major initiative. To support this initiative, EPA is directing more of its resources toward the TMDL program. A factor in the move toward TMDL development is likely to be the increased number and threat of citizen law suits that have been filed against the EPA and certain states for not developing TMDLs for water quality-impaired waters.[6] More than 20 CWA citizen suits have been filed against the EPA and a number of states for failing to develop TMDLs for their 303(d)-listed waters. The development of TMDLs is a complicated process and as communicated by one regulator, "we are looking for guidance from EPA on this issue, particularly in estuary systems."

The Urban Wet Weather Flows committee supports the watershed approach and has stated that greater emphasis should be placed on using the market forces to aid in the clean up of a watershed. They have recommended that credits be considered in the watershed approach as presently used in the air quality program and that EPA should allow any trades that result in improved water quality conditions.[2] Effluent trading has been discussed for a number of years but little action is likely to seen in this area until EPA and states develop TMDLs for specific waterways and then begin developing more specific loading limits for dischargers. Effluent trading has been endorsed by the EPA as seen in the document "Draft Framework for Watershed-Based Trading."[7]

The TMDL FACA Committee issued a draft report[8] this past summer (July 1998) with the committee's specific recommendations based on the following broad areas of agreement:

- Restoring impaired waters must be a high priority for all responsible agencies and sources.
- Implementing TMDLs is the key to program success.
- Communication with the public is crucial.
- Stakeholder involvement in the TMDL program is a key to successful implementation.
- Governments' capacity to carry out the TMDL program needs to be strengthened significantly.
- In cases of uncertainty, an iterative approach to TMDL development and implementation will assure progress toward water quality standards attainment.

Within this report was also the statement that "EPA regulations should provide that all TMDLs must be completed expeditiously but no later than 8 to 15 years after listing. EPA regulations should also provide that, generally, high priority TMDLs be completed within five years after listing." A similar policy was issued to EPA regions from Robert Perciasepe, assistant administrator of the Office of Water for EPA, in 1997.

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[6] See TMDL Lawsuit Information @ http://www.epa.gov/OWOW/tmdl/index.html

[7] This document can be downloaded or viewed @ http://www.epa.gov/OWOW/watershed

[8] "Report of the Federal Advisory Committee on the Total Maximum Daily Load (TMDL) Program," July, 1998, EPA 100-R-98-006.

While the development of TMDLs and subsequent waste load allocations could become an effort controlled and dictated by the regulatory agencies, a new approach (or paradigm) has been suggested and is likely to be implemented in various locations. This approach involves strong participation from the stakeholders in the watershed who essentially do much of the analysis of the water quality problems and develop appropriate controls to meet the water quality standards of the receiving water. This type of approach is in the early stages of development in the Sinclair Inlet to Puget Sound, Washington; note the effort mentioned here was not developed to specifically develop TMDLs. Environmental personnel at the Puget Sound Naval Shipyard have begun the process of bringing together the stakeholders and developing a plan to characterize water quality in the adjacent waters. This effort will promote collection of data already being generated by a number of different groups and developing a central database that will be used to characterize the quality of the water body and the inputs associated with various dischargers. This effort is being supported through an EPA grant under the Project XL Program (see additional notes in Appendix A under Puget Sound Naval Shipyard).

It is expected that greater involvement of local stakeholders in the development of plans to improve a surface water's quality (where impaired) will occur in the future. Evidence of this approach can be seen in southeastern Virginia where the Elizabeth River Project, an organization comprised of members representing public, private/industry (including shipyards), government, environmental groups, academia, and others, have met to develop plans for identifying water quality problems, remediation actions to address water quality problems, a water quality monitoring program, and educational programs. Other groups that exist to study and make recommendations on improvements to water quality (e.g. Willamette River Basin Task Force, Puget Sound Water Quality Action Team) are evidence of the increased role that public-private groups will play in bringing attention to water quality issues in water ways near shipyards and potentially impacting the regulations that are developed for these water bodies.

Much of the loading to surface waters comes from nonregulated (i.e. NPS) sources. The CWA does not give federal statutory authority to regulate NPS, only point sources. Only states can currently regulate NPS and EPA has encouraged states to consider this option. An approach that the UWWF committee discussed during deliberations to entice states to develop NPS regulations was that EPA might award certain funds to states based on their effective control of NPS inputs; states that did not develop control programs would either not receive or receive less of these funds. It was also discussed that mobilizing stakeholders to focus on agriculture would move the process forward to improving water quality. Another idea discussed was making the watershed agreements legally binding.

Many industries, including the shipbuilding and ship repair industry believe that numeric effluent standards (maximum contaminant limits, MCLs) are likely to be added to NPDES permits in the future. They believe that current requirements for monitoring for many contaminants are the first step to developing numeric effluent limits. There currently is wide variation in the requirements for shipyards. While some shipyards have minimum monitoring requirements and even no required chemical testing, other shipyards have extensive monitoring requirements and effluent discharge limits. These requirements include sediment monitoring, effluent limits that are relatively common in non-stormwater NPDES permits (pH, TSS, oil and grease), and some limits on metals (e.g. Avondale's 5

ppm Zn limit, Norshipco's impending 50 ppt TBT limit). Based on NURP findings and the monitoring requirements of many shipyards, it would appear that copper, zinc, and lead would be likely candidates for numeric limits on stormwater discharges. Stormwater discharge limits for tributyl tin (TBT) may also occur in the future; limits of 50 ppt are currently being phased into NPDES permits in Virginia as shipyard VPDES permits are up for reissuance.

The EPA and the UWWF Committee as well as many involved with stormwater issues/management have recognized the difficulty of setting stormwater effluent standards. This is in part because of the highly variable nature of the quality and quantity of stormwater runoff and the lack of scientific data that has linked these inputs to water quality problems (violation of water quality standards) in receiving waters. The lack of developing a direct cause-and-effect relationship has been stated as one of the deficiencies of the EPA-sponsored National Urban Runoff Program (NURP) program which evaluated runoff characteristics across the nation, but not their impact on receiving waters.[9] The difficulty in setting standards also extends to recognizing or accepting a mixing zone (dilution) associated with stormwater inputs. There is wide variation among the states in consideration of a mixing zone or level of dilution for determining the impact of a stormwater discharge on a water body. This variation is likely to persist absent any specific policy or approach supported by EPA.

Reclassification of a water body to a "higher" level of use could have immediate impacts on shipyards that use the water body for a receiving water for stormwater. Such a scenario might be envisioned under the program of naming of American heritage rivers. The Willamette River and the St. John's River, rivers that support shipyards that were visited in this study, have both been nominated for this designation. Reclassification may occur by the state or EPA. Evidence of this move can be seen by recent action (March 5, 1998) by EPA to reclassify (upgrade) a number of rivers in Alabama from their current "Agricultural and Industrial Water Supply." Where this change occurs it would be expected that more stringent discharge permit standards will occur.

Agriculture has largely been exempted from stormwater regulations to date, but increased realization of the contributions of agriculture to water quality is leading to increased effort to control agriculture stormwater runoff. A number of state and federal programs have been developed that promote the use of stormwater BMPs and assist farmers in implementation. The success of these programs in improving water quality has not been well documented. In the watershed approach that is increasingly being promoted, agricultural interests will need to actively participate in many watersheds for the watershed stakeholders to be adequately represented. Agricultural activities frequently contribute nutrients (nitrogen and phosphorus) to surrounding surface waters and better control of agricultural practices should lower this loading. Another contaminant that is associated with stormwater runoff from agricultural fields is copper which is found in a number of agricultural chemicals. Since copper is a common constituent found in shipyard stormwaters, due to its use as a biocide in marine paints, the reduction of inputs from agricultural sources can potentially lower the copper concentrations in the surface water. This could lead to improvements sufficient to have an impaired water body removed from a state's 303(d) list and/or increase the water body's ability to assimilate loadings from other sources.

[9] As discussed in "Implementing Urban Stormwater Runoff Quality Management Regulations" by G.F. Lee and A. Jones-Lee, In *Engineering and Management*, April, 1995, p. 40.

With regard to the development of TMDLs and water quality standards in general, nutrients appear to be the focus in the immediate future. This effort has been indicated in various publications and when asked to comment on what specific changes that he envisioned for stormwater at industrial facilities, Mike Cook, Director of the EPA Office of Wastewater Management, stated that nutrients would now be a key focus. The Clean Water Action Plan (CWAP) announced by President Clinton on February 14, 1998 also includes language indicating the efforts that would be directed toward nutrients. Within the CWAP the need to adopt water quality standards for nutrients is specifically noted as well as a focus on nutrients in TMDL development. Nutrient concentrations are typically not a constituent identified as problematic in shipyard discharges. Thus, developments in this area would not be expected to adversely affect shipyards. However, the CWAP also indicates EPA will actively enforce Phase I requirements and address Phase I noncompliance by targeting priority watersheds where stormwater is a concern.

Water quality standards set for surface waters combined with the concentrations of specific parameter concentrations in a surface water will control the concentrations of constituents that are allowed in stormwater discharges. If water quality standards are lowered for a particular parameter, it could have the immediate effect of changing the status of a water body from attainment to non-attainment. On July 7, 1998 EPA issued an advanced notice of proposed rule making (ANPRM) seeking comments from interested parties on possible revisions to the national water quality standards program that are intended to improve the effectiveness of water quality standards. Specific areas that EPA is seeking comment on are:

- Use designations and how use attainability analysis should be administered,
- Ambient water quality criteria, including site specific criteria procedures and the codification of a CWA requirement to adopt numeric toxic criteria,
- Mixing zone policy and implementation procedures, and
- Increased use of toxicological, physical, and biological data.

Since each of these issues relates to stormwater discharges and their impact on the receiving body of water, any changes could ultimately affect controls placed on these discharges.

A future development that may influence the activities at shipyards is the creation of sediment quality standards. EPA has been involved for a number of years in studying the sediment quality issue and has analyzed sediments collected from a number of regions from around the country. As part of this effort EPA released a three-volume report[10] on January 7, 1998 detailing sediment quality in the United States. Within the report it is stated that 7% of surveyed watersheds were sufficiently contaminated with toxic pollutants to pose potential risks to people who eat fish from them. In a Fact Sheet "EPA's Contaminated Sediment Management Strategy" issued in April 1998 the support of EPA for including sediment quality within the NPDES permit is stated. As noted in the Fact Sheet:

> *State and Federal permit writers currently have the authority to establish water quality-based effluent limits in NPDES permits for the protection of aquatic resources. NPDES permit limits are currently derived from State water quality*

[10] "The Incidence and Severity of Sediment Contamination in Surface Waters of the United States"

standards, which in turn may be derived from EPA s water quality criteria. Once EPA publishes sediment quality criteria and the accompanying user s guide, EPA intends to recommend that the States use these numerical chemical criteria, which are guidance, along with appropriate test endpoints for chronic sediment bioassays (toxicity and bioaccumulation tests) in interpreting their narrative criteria, e.g. of no toxics in toxic amounts. OST, in coordination with the Office of Wastewater Management (OWM), is developing sediment-based modeling tools for use in calculating NPDES permit limits and TMDLs.

This evidence suggests that EPA may encourage states (who largely administer the NPDES program) to incorporate sediment quality considerations when developing permit requirements for stormwater discharges. If this occurs then it may lead to more stringent controls to shipyards that discharge to waterways where the sediments have been identified as contaminated.

V. Results from the Stormwater Survey and Shipyard Visitations

The stormwater survey developed and executed in this study was directed to determine the various regulatory requirements among states and the EPA and what efforts shipyards have made to control and manage stormwater. A copy of the survey is included in Appendix B as well as a summary of the results. Selected results will be presented and discussed here.

Of the 15 years that responded to the survey all held NPDES permits with 13 indicating that stormwater was included and two indicated that a notice of intent (NOI) to obtain a permit that covers stormwater had been submitted to the appropriate agency. The majority of the shipyards (12) had a state agency issue their permits and all that had permits also had SWP_3s developed for their facility.

Stormwater collected at shipyards is primarily channeled and discharged to receiving water without treatment or attempts to recycle or reuse (see responses to questions #7 and #17 in Appendix B). At two shipyards that were surveyed and visited, water is collected from the drydock when a ship is on the dock and treated for particulate material and oil and grease removal. At three shipyards that were visited, stormwater generated at vehicle maintenance/washdown/fueling/steam cleaning areas were isolated and sent to an on-site oily wastewater treatment plant. This volume is generally a small quantity relative to the volume generated from the rest of the shipyard. Nine of fifteen shipyards reportedly used structural BMPs; this may be under reported. All of the shipyards that were visited employed nonstructural BMPs.

There is considerable variability in monitoring and discharge limits required of shipyards around the country. Nearly half (7) reported no discharge limits and three reported no monitoring requirements; (see responses to questions #11 and #12). Five shipyards reported requirements to conduct whole effluent toxicity testing. Three shipyards reported additional local requirements beyond the NPDES permit while the majority of the shipyards (11) indicated that the permitting authority had or was in the process of developing TMDLs for their receiving water. Three shipyards indicated that their permitting agency had adopted or was planning on adopting (i.e. allowing or promoting) an effluent trading approach for the receiving water.

Sources and Mobilization of Contaminants at Shipyards

Many different activities occur at shipyards that have a bearing on the types and quantities of contaminants that might be transported with stormwater runoff from these sites. From the shipyard survey, the following activities and the number reporting (out of a total of 15) were reported:

Reported Activity	Number
Ship repair	14
Sandblasting/painting	14
Pier operations	13
Welding	13
Dumpsters	13
Scrap/waste materials	12
Vehicle maintenance	11
Vehicle maintenance areas	11
Fueling stations/fuel storage areas	11
Hazardous waste storage areas	10
Chemical storage/transfer stations	9
Solid waste transfer	8
Vehicle washdown/steam cleaning	8

Some of these items are fairly broad descriptions (e.g. pier operation, ship repair) in which a number of specific operations can occur (some of which are listed separately above). These activities and others not listed will be discussed with regard to their ability to mobilize into stormwater.

The contaminants of concern in shipyard-generated stormwater can be determined by examining the permit and monitoring requirements for shipyards and from past experiences with stormwater runoff.[11] The parameters of concern are identified as:

- *Particulate material* measured as total suspended solids (TSS) or turbidity,
- *Metals* including copper, zinc, cadmium, chromium, lead, nickel, silver, mercury, tin, tributyl tin (TBT).
- *Hydrocarbons and other organic compounds* measured as oil and grease, PAH, petroleum hydrocarbons, or TOC,

Each of these will be discussed individually below in relationship to their source at a shipyard and the likely contact with precipitation or stormwater runoff.

[11] "Characterization and Modeling of Stormwater Runoff from a Floating Drydock," A.O. Akan, G.C. Schafran, and J.Yoon, Final Report to CASRM, 1997.

Particulate Material

Particulate material can originate from numerous sources and can have widely different chemical and physical characteristics. Sources of particulate material include that generated during blasting (hydroblasting as well as traditional sand/grit blasting) including the grit, paint chips, and marine growth, the cutting and grinding of metal, disturbance of unpaved areas, painting, open storage of spent grit, open storage of other small particulate solids, rust, discarded construction materials, spilled dry chemicals, and vehicle cleaning. These sources are generally all well known to environmental personnel at shipyards and many BMPs have been developed to control particle mobilization.

Particulate material is mobilized into stormwater when the kinetic energy of runoff exceeds the gravitational and frictional forces that would keep it in place. Both the size and the density of the particulate material play important roles in mobilization with smaller diameter, lower density particles more easily mobilized. In addition to particle characteristics, the location of particulate material relative to storm drains and points of discharge to surface waters are important since particulate material at increasing distance from a storm drain has a lower probability of reaching the drain.

Impervious surfaces can serve to lower or increase the mobilization of particulate material depending on activities on the land surface. Paving a land area will prevent soil particles from contacting stormwater runoff and prevent their mobilization. However, the kinetic energy of stormwater runoff increases when land area is converted to impervious cover and if particulate material is allowed to collect on this surface, it may be mobilized in greater amounts compared to the previously unpaved, pervious area.

Metals/Heavy Metals

As noted earlier in this report, copper, zinc, and lead are three metals that are the most widely monitored and controlled in NPDES permits. Consequently, the discussion concerning metals will concentrate on these three commonly observed metals. The other metals mentioned above are in certain shipyards' permits either because have been observed before or they are suspected to be present in stormwater.

The dominant source of copper in shipyard stormwater is likely from the contact with copper-based marine paints. In drydocks or marine rails the removal of old paint and the application of new paint results in paint chips and overspray, respectively, being deposited to surfaces adjacent to the ships or piece work being worked on. If stormwater subsequently contacts these deposited materials particulate metal mobilization can occur as well as mobilization by dissolution into stormwater. The dissolution of particulate metals (copper and zinc) in shipyard drydock "sweepings" has previously been studied and observed to be a relatively rapid process.[11] Consequently, minimizing the contact of both direct precipitation and stormwater runoff with these materials will lower their mobilization and the concentrations in stormwater. Copper may also be mobilized from other sources at the shipyard including waste metal scraps, finished metal pieces, equipment, and even gutters, roofing material, or

flashing that may be copper based. Mobilization from spilled paint in open areas could also be a source. A BMP that has been utilized by some shipyards is to designate one, covered area as a mixing/pouring area for paints. Spills in this area would not be open to contact with rainwater or stormwater runoff. (Note, with a highly visible case brought by EPA Region 5 against General Motors for violation of copper, lead, and zinc limits it had been argued by GM that the cause of the elevated metal concentrations was the dissolution of roofing materials by acidic rain. Rulings in the case have stated it is immaterial where the metals originate, only that they violate the GM permit.)

Zinc is another metal that is abundantly present at shipyards due in large part to its inclusion in steel primers. As discussed earlier, high-zinc primers have favorable characteristics for welding while primers with lower zinc concentration are more difficult to work with. A likely of source of zinc in stormwater is steel stock that is primed and stored outdoors. Storing zinc-primed steel outdoors is a common practice at shipyards and results in direct contact of precipitation with the zinc-based primer. Dissolution of zinc likely occurs leading to the mobilization of (dissolved) zinc into the stormwater flowing across the metal surface. This zinc would likely behave conservativley and not be removed to any significant extant unless the pH were to rise to higher values (pH>8) which is generally not observed in stormwater.

Zinc anodes used as part of cathodic protection systems on ship hulls are another potential source of zinc in shipyards. Mobilization would occur most likely through direct contact of precipitation with the metal surface. If the anodes are located where storm runoff would contact them, mobilization will also occur. While many shipyards store these anodes under cover, others were observed to have them in uncovered areas where they would be contacted by precipitation.

Tributyl tin is another constituent that is monitored in some permits and is going to be regulated in NPDES permits issued in Virginia beginning in 1999. The source of TBT in shipyards is likely associated with the removal and application of TBT paints on the hulls of ships in drydock and then contact with stormwater. While the US Navy has moved away from TBT-based paints, and its use has been banned on smaller vessels, commercial vessels, particularly cruise liners, still favor this paint. Mobilization of TBT from paint chips and overspray is likely relatively quick based on the paint's characteristic of continuous dissolution while in water. While many shipyards have not used TBT paints for some years and believe that there would be no problem with meeting future requirements, paint overspray and paint chips that may have been deposited in the shipyard may prove a source of TBT for a prolonged period of time. Evidence of this potential prolonged effect was monitoring data for TBT in stormwater (showing concentrations > 1000 ppt) observed at one shipyard where personnel indicated that TBT had not been used for a couple of years.

Hydrocarbons and Other Organic Compounds

Many shipyards have oil and grease or other organic compound limits to regulate the discharge of these materials to surface waters. Organic compounds are ubiquitous at shipyards due to the presence of hydrocarbon fuels, lubricants, paints, solvents, and hydraulic fluids. Places that are well recognized for the potential to contribute organic compounds to stormwater are vehicle fueling locations, vehicle maintenance areas, vehicle washdown areas, paint storage and mixing areas, hazardous waste storage areas, non-paint chemical storage areas, and areas where surfaces are blasted for paint removal and/or painted. Marine paints readily leach metals and organic compounds. Hence,

the exposure of overspray or paint chips to precipitation or runoff will cause mobilization of organic compounds into stormwater runoff.

Stormwater Management Through the Use of BMPs

Due to the interim approach of requiring stormwater pollution prevention plans to meet the BAT/BPT requirements of the CWA, most shipyards have permitting authority-approved SWP_3s in place. BMPs were evident at all shipyards that were visited. The most widely recognized BMP is that of good housekeeping. This consists of regularly cleaning the work areas where particulate material accumulates. This is accomplished in many shipyards through hand sweeping (in small areas) and using a "street sweeper" in areas where it is accessible. Areas where regular cleaning occurs include drydocks, piers, and other paved areas in yard. It was apparent through visitation that some yards are very active in this effort while other yards spend less time with surface cleaning. More frequent efforts of cleaning are likely to lower particulate matter discharges, lower concentrations of metals, and potentially lower organic compound discharges.

Another area where many shipyards are controlling the discharge of contaminants is through isolation of vehicle maintenance, vehicle cleaning, and vehicle fueling operations from stormwater collected from the rest of a shipyard. These areas are typically drained separately to a collection point where the water is treated in an on-site oily water treatment process or discharged to wastewater collection system operated by a local POTW. BMP/NPDES training has also been integrated at many shipyards into new employee programs, training for managers, programs for sub-contractors on site, and regular training for all employees. Other BMPs that are widely used include:

- Storm drain filters and adsorbent pads
- Secondary containment
- Drip pans
- Spent abrasive and paint overspray control
- On-site BMP committee
- Catch basin cleaning
- Overhead coverage and shrouding
- Retention ponds
- Treatment
- Stormwater diversion
- Erosion control and site stabilization
- Spill cleanup
- Designated paint mixing areas
- Regular inspections of BMPs
- Storm drain inlet protection
- Enclosed containment
- Hay bales
- Sally port screening and filtering
- Cleaning of pier scuppers
- Drydock stormwater collection system

VI. Stormwater Treatment Options

The use of BMPs as the primary measure of protection of water quality in receiving waters has been noted to be an interim approach and for shipyards who discharge to waters that have been designated as nonattainment for their classification, more rigorous controls on discharges may be required. In the sections below, available treatment processes for stormwater treatment are discussed as well as listing of specific suppliers, a case study for metals removal, and a review of available treatment alternatives and associated costs for the Todd Pacific Shipyard in Seattle, WA. This section is then followed by information concerning the pending availability of data for structural BMPs and stormwater treatment processes that is currently being collected.

Available Stormwater Treatment Processes: Passive, Non-Mechanical Devices

This section serves as a guide to available stormwater treatment processes, that are implemented in passive, operator-free, and low maintenance devices. These processes rely on the physical processes sedimentation, flotation, and filtration.

Oil-Water Separation

Greases and oils accumulate at the water surface and can be removed in skimming tanks. A skimming tank is a chamber so arranged that floating matter rises and remains on the surface of the waste water until removed, while the liquid flows out continuously through deep outlets or under partitions, curtain walls, or deep scum boards. This may be accomplished in a separate tank or combined with grit removal. Most skimming tanks are rectangular or circular and provide for a detention time period of one to fifteen minutes. The outlet, which is submerged, is opposite of the inlet and at a lower elevation to assist in flotation and to remove any solids that may settle.

An example for an oil-water separator implemented in a commercial stormwater treatment unit is shown in Figure 1.

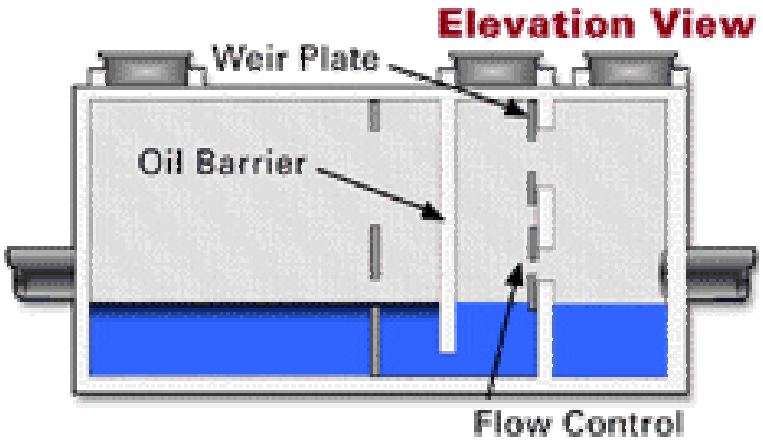

Figure 1. *Vortechs*Ô Stormwater Treatment System (Elevation View).

Solids Removal

Grit chambers are typically used to remove settleable solids. There are two general types of non-mechanical grit chambers: horizontal-flow and vortex type. Horizontal-flow grit chambers are principally designed for constant flow rates and thus not suitable for stormwater treatment. In the vortex-type grit chambers a free vortex is generated by the flow entering the unit tangentially. Several types of vortex separators have been developed during the last 30 years. Their major function has been to provide both flow regulation and settleable solids concentration for the control of combined sewer overflows (CSOs). The performance of vortex devices depends on the settling velocity distribution of the particles in the stormwater. When correctly installed with other controls in combined sewer or separate stormwater systems, vortex devices can play an important role in the control of pollution from stormwater discharge.

An example for a vortex-type grit chamber implemented in a commercial stormwater treatment unit is shown in Figure [1]2. (The figures used in this report have been copied from manufacturers' internet web sites and are provided for example only. The use of these figures does not indicate an endorsement of the product or the manufacturer).

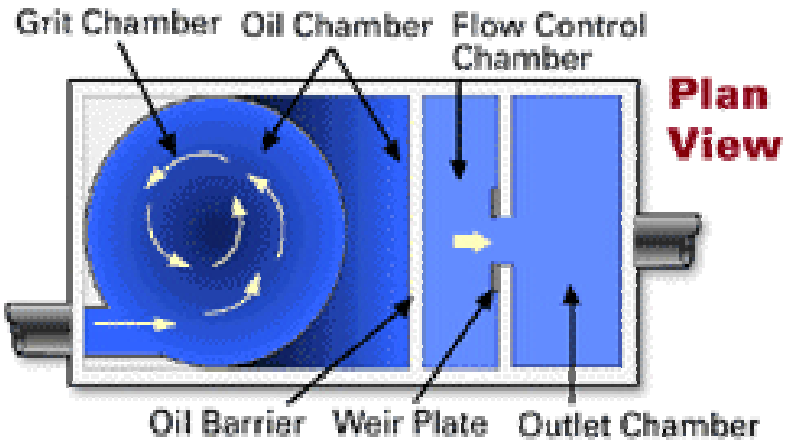

Figure 2. *Vortechs*Ô Stormwater Treatment System (Plan View).

Filters are utilized to remove non-settleable solids from waste waters. Depending on the filter media used, dissolved adsorbable contaminants can also be removed from stormwater runoff. Typical filter media include fabric, sand, activated carbon, and zeolite. Depending on the waste load characteristics, frequent replacement or restoration of the filter media may be required. Figure 3 shows a simple commercial filter device integrated in a catch basin. This particular device fits most storm drains, is easily installed, and is intended to be serviced quarterly to remove sediment and debris, depending on accumulation. The sediment and debris can be vacuumed out of the modules through the mouth of the curb drain with conventional maintenance equipment.

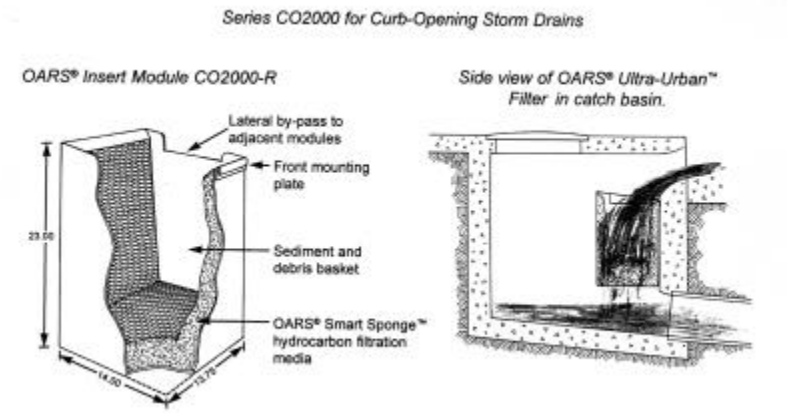

Figure 3. *Ultra-Urban* with *OARS® Smart Sponge* Filtration Media.

An integrated system with an advanced filtration device is shown in Figure 4. The filtration device can be utilized with a variety of different filter media.

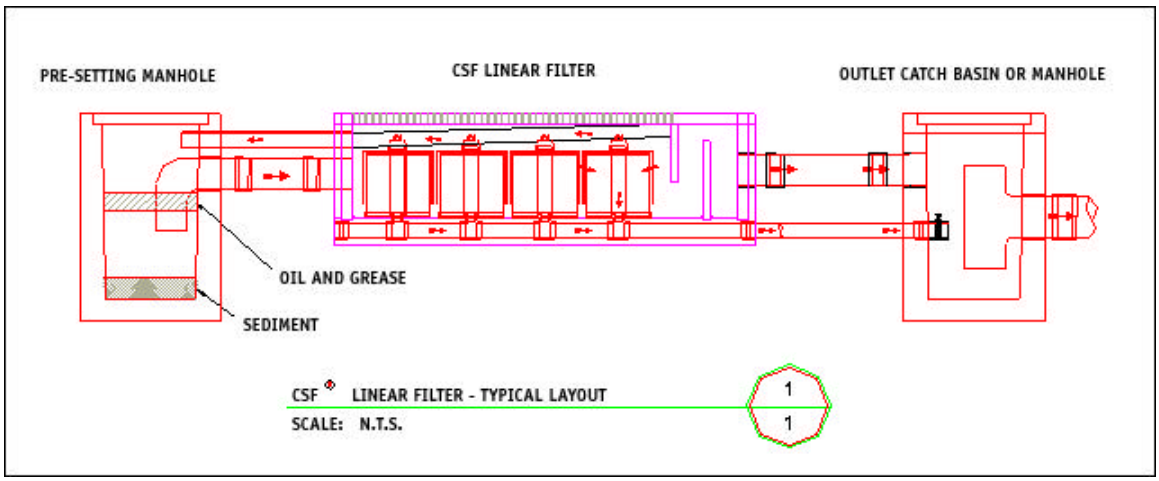

Figure 4. *Stormwater Management StormFilter*

Metals Removal

Metals, when bound to particulate matter, are removed through solids removal processes. Dissolved metals can be removed to a certain extent through filtration. Careful selection of filtration media is necessary to achieve the targeted pollutant removal.

Advanced Stormwater Treatment Systems

Advanced stormwater treatment systems can be designed for any targeted pollutant and usually achieve very high removal rates. Treatment systems are typically preceded by grit chambers, bar screens, or presettling basins to remove coarse solids and protect downstream mechanical devices from damage by abrasion. Since the processes listed below perform best at steady state, a facility for flow equalization (e.g. detention ponds) is necessary. Advanced stormwater treatment systems consist usually of:

- chemical destabilization of suspended material
- chemical precipitation of dissolved metals
- aggregation of destabilized particles (flocculation)
- physical removal of particles (floc) and precipitates (solid-liquid separation)

Chemical Destabilization of Suspended Material (Coagulation)

A suitable chemical coagulant, typically a metal salt such as alum or ferric sulfate is added to the pretreated stormwater in a mixing basin. The metal hydrolysis products that are formed in the mixing stage attach to the suspended solids and neutralize the surface charge (destabilization). The destabilized particles can then form flocs during the flocculation stage of the treatment process. This unit process can aid in removing dissolved toxic metals by adsorption to flocs or coprecipitation. Depending on the stormwater characteristics, pH adjustment may be necessary prior to coagulant addition.

Chemical Precipitation of Dissolved Metals

This unit process is utilized to remove dissolved metals by directly precipitating an insoluble metal complex through pH adjustment. This is accomplished by adding a strong base such as lime or caustic soda to the waste water.

Aggregation of Destabilized Particles (Flocculation)

Chemically destabilized particles have to be aggregated to flocs that can be easily removed through solid-liquid separation processes. Flocculation occurs during a gentle mixing phase in a designated basin.

Solid-Liquid Separation (Clarification)

Three principal processes for the physical removal of particulate matter are available: sedimentation, dissolved air flotation, and filtration. During sedimentation flocs settle by gravity to the bottom of a large detention basin, where they can subsequently removed by scrapers or similar devices. Sedimentation basins usually require large surface areas.
During the dissolved air flotation process, air is injected to a pressurized wastewater side-stream. Upon entrance to the main water stream and the concurring pressure release, micron-sized bubbles form, that attach to suspended matter in the waste water, and float to the water surface, where they are skimmed off with a suitable device. Dissolved air flotation units require a much smaller area that sedimentation basin and can also be operated without chemical coagulants.

Case Study: DrydockWater Stormwater/Process Water Treatment at Norfolk Naval Shipyard

In 1992 the Norfolk Naval Shipyard received a consent order from the State of Virginia because of NPDES permit violations for toxic metals in waters discharged from the drydock. To remediate the problem, a facility was designed to capture and treat the contaminated waters (runoff and bilgewater). A basic flow diagram of the treatment system is shown in Figure 5.

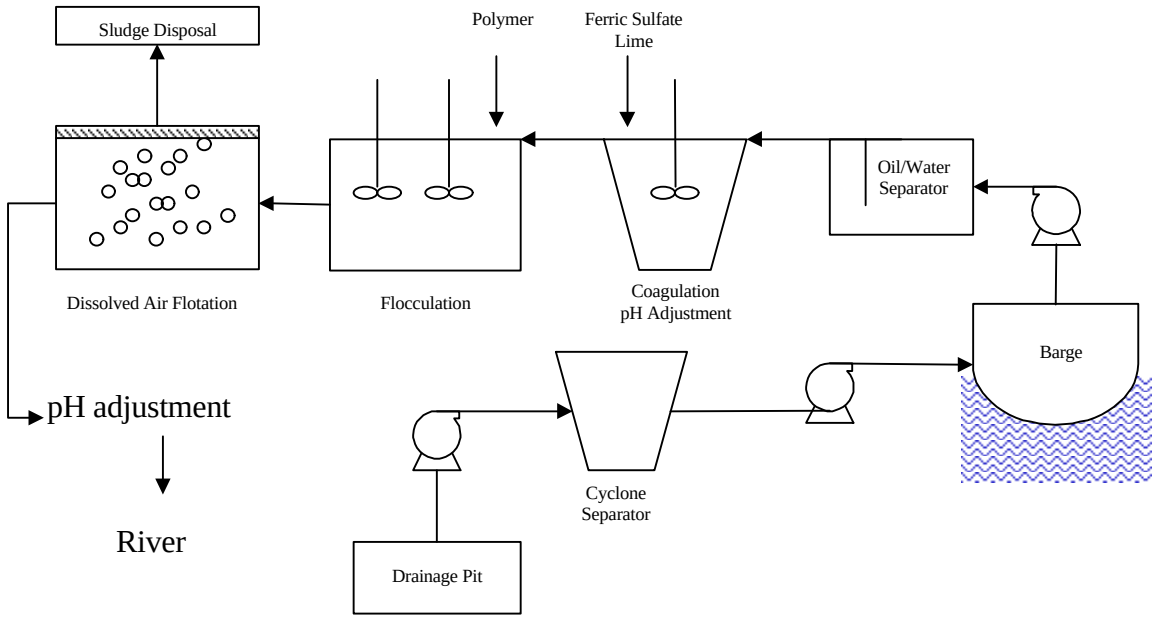

Figure 5. Schematic of the Norfolk Naval Shipyard Treatment System.

Water collected in the drainage pit is pumped to a cyclone separator, that removes dense particulate matter. The water is then transferred to a barge, that serves as a flow equalization basin. The waste water is then pretreated in a vertical tube coalescing oil/water separator. In a mixing basin ferric sulfate and lime for pH adjustment is added. An organic polymer is injected at the head of the flocculation tank to enhance solid-liquid separation. Solids are then removed in a dissolved air flotation unit and the pH is adjusted to the pH 6-9 range (required by permit) before discharge to the river.

The overall process achieved the following removal rates

- Copper, Zinc > 90%
- Non emulsified oil, grease, and hydrocarbons > 90%

Comparison of Stormwater Treatment Alternatives at: Todd Pacific Shipyards

As a condition of their recently awarded NPDES permit, Todd Shipyards was required to prepare a report that identifies and evaluates all known, available, and reasonable methods of prevention, control, and treatment (AKART) for stormwater generated at the facility. This information, collected from the study that was commissioned,[12] is presented here as it provides an opportunity to directly compare various options and related costs specifically for shipyard setting.

The pollutants of concern at the facility included copper, lead, zinc and suspended solids. The

[12] Stormwater AKART Analysis Todd Pacific Shipyards, Landau Associates, Inc. May 20, 1998.

AKART report addresses five treatment alternatives:

1) Catch basin solids filtration: The current practice at the facility beyond BMPs is to line the underside of the catch basin grates with a filter fabric. This method is not capable of removing dissolved metals. It is also expected to remove suspended solids with low effectiveness. This alternative has the lowest capital and lifecycle costs.

2) Catch basin enhanced filtration: In this alternative, enhanced filtration media is placed as an insert in the catch basin primarily for the adsorption of dissolved metals. This method will require frequent replacement of the filter media. This treatment alternative has low technical feasibility because of high maintenance requirements and lack of operational data required for design.

3) End-of-pipe sand filtration: This alternative involves pumping the stormwater near the outfall to a large surge tank and subsequent sand filtration. A higher removal rate for suspended solids can be expected than for catch basin solids filtration. However, dissolved metal would not be removed either. This method has a high technical feasibility and would be most cost-effective for suspended solids removal.

4) End-of-pipe enhanced filtration: In this method, water would be transferred from the surge tank to a filter with enhanced filtration media, that would be capable of effectively removing copper, zinc, and lead. This alternative would have moderate technical feasibility because of lake of operational data but appears to be the most cost-effective alternative for metal removal.

5) End-of-pipe chemical treatment: Pollutant removal would be accomplished through chemical precipitation, coagulation using a polymer, settling, and ultrafiltration. This alternative is expected to achieve the highest removal rates for the target pollutants. However, it would require most operation attention and maintenance due to its complexity. Chemical treatment would provide maximum suspended solids and metals reductions but would incur very high costs not commensurate with the incremental benefit.

In addition to the treatment alternatives, site-specific management strategies were addressed:

6) Discharge to sanitary sewer: Stormwater would be pumped to a surge tank and then pumped to the sanitary sewer at a controlled flow rate. This technically highly feasible alternative would be relatively low in cost based on the current discharge fees.

7) Stormwater infiltration: This alternative would involve construction of an infiltration gallery on site. The effluent from a sand filter (for solids removal) would be pumped to perforated piping in a gravel bed. Metal removal would occur through adsorption to the soil. The effectiveness of this process depends on the site soil geology.

A summary of the order of magnitude alternative costs was developed and tabulated. This table is reproduced below:

Table 2. Costs of Selected Treatment Alternatives

Alternative	Capital Cost	Annual O& M Cost	Present Worth
1. Catch Basin Solids Filtration	$1,000	$9,900	$77,000
2. Catch Basin Enhanced Filtration	$224,100	$63,100	$711,000
3. End-of-Pipe Sand Filtration	$341,000	$14,000	$449,000
4. End-of-Pipe Enhanced Filtration	$405,800	$21,400	$571,000
5. End-of-Pipe Chemical Treatment	$776,900	$33,600	$1,036,000
6. End-of-Pipe Surge Tank and Discharge to Sanitary Sewer	$134,000	$26,800	$341,000
7. End-of-Pipe Sand Filtration and Infiltration	$443,000	$15,400	$562,000

Notes: - Present worth based on ten years of operation and a 5% annual discount rate.
- For cost estimates for both alternatives 2 and 4, it is assumed non-regenerable media will be used for enhanced filtration.

Based on a comparison of capital and operation and maintenance costs, effectiveness, and technical feasibility, alternative 6 was recommended.

Stormwater Treatment Equipment Manufacturers

Due to the increasingly greater interest in controlling the quality of stormwater inputs to waterways a number of manufacturers have developed treatment systems that are commercially available. Some of these systems were illustrated earlier in the report. The selection of those systems for illustration does constitute an endorsement or imply a particular level of treatment. Similarly, the table below lists some of the manufacturers and their contact information but implies no endorsement or level of treatment. Additional vendors can be found through professional journal issues dealing with manufacturer information.

Table 3. Selected Manufacturer References

Name	Type of Equipment	Address
AbTech Industries	Filters, Skimmers	4110 N. Scottsdale Rd, #235 Scottsdale, AZ 85251 Tel: 602-874-4000 Fax: 602-970-1665 www.oars97.com
Jalbert Environmental, Inc.	Oil/Water separation, dissolved air flotation, filtration, carbon sorption, chemical precipitation	150 S. Main Street Norfolk, VA 23523 Tel.: 757-494-1974 Fax: 757-494-7464
Stormceptor	Vortex Devices (Oil/Solids Removal)	Tel: 800-762-4703 www.stormceptor.com
Remedial Solutions, Inc.	Filtration systems	One Northgate Park, Suite 406 Chattanooga, TN 37415 Tel: 423-870-8888 Fax: 423-870-1005 www.remedialsolutions.com
StormTreat Systems, Inc.	Biological Filters	90 Route 6A Sextant Hill, Unit 1 Sandwich, MA 02563 Tel: (508) 833-1033 Fax: (508) 833-3150 www.stormtreat.com
Vortechnics, Inc.	Vortex Devices (Oil/Solids Removal)	41 Evergreen Drive Portland, ME 04103 Tel: 207-878-3662 Fax: 207-878-8507 www.vortechnics.com
Cornerstone Technologies Inc.	Stormwater & Wastewater Recycling Systems	1650 Ximeno Avenue, Suite 240, Long Beach California 90804 Tel: 562-494-9465 Fax: 562-494-5296
Stormwater Management	Filtration devices	2035 N.E. Columbia Blvd. Portland, OR 97211 Phone: (503) 240-3393 Toll Free: (800) 548-4667 Fax: (503) 240-9553 www.stormwatermgt.com

Treatment Comparison Data

The need to have good stormwater treatment data to adequately design systems to meet needed or desired contaminant removals is obvious. However, because of the relatively new requirements for stormwater treatment, there is a lack of verifiable data to characterize various treatment systems. To address this deficiency EPA and the American Society of Civil Engineering's (ASCE) Urban Water Resources Research Council have teamed up to develop a national database of BMP effectiveness. This project is ongoing and information is currently available through the ASCE web site (http://www.asce.org/peta/tech/mastbib1.html). While this effort is a clearinghouse for the submission of data from various sources (with little ability to control data quality), another program that has been established between EPA and ASCE seeks to better compare these technologies through head-to-head testing. This effort (Stormwater BMP Verification Program) to compare various technologies on the same wastewater stream is being managed and coordinated through the ASCE Civil Engineering Research Foundation's Environmental Technology Evaluation Center (EvTEC). The first comparison studies for four technologies are scheduled to take place in Seattle, WA in the fall of 1999. In addition to these efforts there is additional research being conducted through EPA's Office of Wastewater Management. Under the Wet Weather Flow Research program a number of treatment systems are also being evaluated. Much of this information should be available in the next one to two years.

VII. Guidance for Shipyards on Stormwater Issues

As can be seen in this report the stormwater program covering industrial sources is evolving but for the near term (0 to 2 years) will not see any drastic changes at the federal level that should dramatically impact shipyards. Phase II stormwater regulations will primarily affect municipalities but indirect effects on shipyards that discharge to municipal systems could occur. The development of TMDLs over the next 5 to 15 years is likely to impact shipyards that discharge to waters where these limits are developed. Shipyards should prepare for this effort and become actively involved in the process of setting the TMDLs. The endorsement of the watershed approach that includeds consideration of the inputs/viewpoints of the various stakeholders is a regulatory setting process that appears to be the new paradigm for the immediate future. To develop parameter-specific TMDLs and subsequent waste load allocations, good quality data will need to be in hand for each watershed and surface water under consideration. This lack of data will prolong the development of TMDLs for many systems.

Additional regulatory changes at the federal level include the development of sediment quality standards, new water quality standards (particularly for nutrients), and development of a policy on mixing zone analysis. In addition, increased enforcement has been recently observed as evidenced between 1996 and 1997 when the number of CWA cases referred to the Department of Justice increased from 48 to 98 and administrative penalty complaints increased from 153 to 329. Note, most of the NPDES stormwater permitting activity occurs at the state level and certain states are likely to see some changes that have significant impact. Two states with significant ship building activity have

recently received (Louisiana), or will receive (Texas) NPDES permitting authority. How these programs will be run is probably less discernible to shipyards in those states than in others due to the short experience (or no experience) with the regulators and the permitting program. As has been communicated repeatedly by shipyard environmental personnel, establishing and maintaining good relationships with the regulators is advantageous to the shipyards.

Data to compare various structural BMPs and stormwater treatment equipment for removal of specific contaminants is not yet widely available. This deficiency should be corrected in the near future as efforts to collect and generate comparison data for BMPs and stormwater equipment are currently proceeding.

Appendix A:

Notes from Shipyard Visitations

- Stormwater Regulatory Authority is the Florida Dept. of Environmental Protection
- Only two yards of significant size in FL (other is in Tampa)
- This yard has moved away from outdoor blasting by constructing buildings that support indoor blasting for metal surface preparation (there is no outdoor blasting for new metal preparation).
- When working (hydroblasting, ultra-high pressure washing) on ship hulls in drydock, a filter fabric is laid on the bottom of the drydocks (multiple layers below the keel) to capture particulate material and preventing its washoff into the St. John's River. Because of the generally high ambient temperatures, water that reaches the drydock and is soaked up in the filter fabric evaporates and leads to little runoff. They have been using an Amoco geotextile with a texture like felt.
- AM/AD has been also using this fabric as a filter for shipyard storm drains. A sheet of the material is laid below the storm grate causing storm runoff to percolate through the fabric. Particulate material is "filtered" out in this manner. The filters were reported to be inspected weekly and replaced every couple of months. Testing with various filters at the bench-scale, they found wool to work best and it appears to be economical. They are expecting to switch to the wool fabric sometime in the future.
- Outdoor maintenance slab: stormwater that runs off the slab is collected and sent to a DAF unit. Effluent from the DAF unit is transferred to a sewage treatment plant operated by the shipyard.
- The shipyard has a stormwater management plan recently updated with a new topographic map.
- Surface runoff in certain areas of the yard are conveyed to wet stormwater retention ponds. These ponds were sized so that discharge to the St. John's River is rare.
- Sampling is required once per year under the NPDES permit. There were reported problems with zinc and copper concentrations. Three representative outfalls are sampled. The following parameters are monitored at all three sites: total recoverable copper and zinc, flow, pH, TSS, COD, Oil & Grease. Total recoverable lead, aluminum, antimony, cadmium, and nickel are required at one outfall. It is expected that after five years of monitoring that numeric limits will be included in the discharge permit.
- Watershed approach: The FDEP appears to be taking a watershed approach to managing water quality. Recent studies by the FDEP of the St. John's River have indicated that the river suffers from elevated nutrients. The source of the nutrients has been identified as point source discharges from wastewater treatment plants. Leaking septic tanks/fields have also been identified as significant contributors. Presently, nutrients are the primary concern of the FDEP and metals and other parameters are of secondary concern.
- The FDEP has been focusing on industries and activities closer to Jacksonville. The St. John's River has been recently designated as an American heritage river.
- AM/AD has decided that any new developments at the shipyard that require new storm drains/collection system that stormwater will be routed through storm ponds; no direct discharges to the river. They have studied retrofitting current outfalls with pumps and tanks to transport stormwater through storm ponds.

- It was reported that wet ponds may be designed to handle the 100-year storm in the Jacksonville area so that overflow would be eliminated and hence, there would be no stormwater discharge to a "water of the United States."
- Weekly inspections are carried out to insure that materials that should be under cover are indeed under cover.
- The shipyard is swept on a regular and frequent basis.
- For blasting of small pieces that has to be conducted outdoors a tarp is laid down where work is being conducted and when workers are finished, the tarp is shaken into a dumpster.
- Gravel cover has been used in some areas to increase infiltration and minimize runoff.
- St. John's River is classified as a Class III recreational river.

Avondale Shipyard — Avondale, LA

- Louisiana has recently (August 27, 1996) received authority (from EPA Region 6) to administer its own permits under the NPDES program. The permitting authority is the Louisiana Dept. of Environmental Quality.
- It was reported that many shipyards in Region 6 are still not permitted for stormwater.
- Avondale's permit is under negotiation and has not been transferred to the LA DEQ. Shipyards in LA have been excluded from obtaining the general permit.
- The shipyard has consolidated 30 stormwater outfalls into three.
- Biomonitoring of stormwater at 6% dilution with Mississippi River water has passed.
- Avondale has had limits for Zinc (5 mg Zn/L) since 1984. Other metals are generally below quantitative limits. In 1992-93, EPA Region 6 attempted to impose metal finishers limits on the shipyard. This effort was eventually dropped. EPA has been trying to lower the zinc limit to 3 mg/L. Approximately ten years ago, to meet the 5 mg/L limit Avondale switched to a low-zinc primer. While this switch has lowered the zinc concentrations in stormwater it has had negative consequences for production. Low-zinc primers have a lower welding speed and the burnback is much greater than with high zinc primers. Low-zinc primers require greater rewelding of seems which causes more particulate and other emissions in the atmosphere. The shipyard is attempting to switch back to a high-zinc primer.
- Stormwater is collected at various sumps and then pumped into the river. This system allows spills to be caught before discharge and also help lower the particulate material in discharge (i.e. it settles in the sump).
- The shipyard has an SWP_3 that is approximately 1-year old. BMPs utilized include general housekeeping/clean up, drip pans, immediate spill clean up, blasting in areas where there are no stormwater drains, blasting in doors (steel grit is used indoors, black beauty outdoors), and curtains on drydocks to name a few.
- Stormwater on the drydock is generally not controlled or "filtered" but is allowed to flow directly into the river. A lip on one end of the drydock does help to limit storm flow.
- There are no local stormwater regulations that the shipyard has to comply with.

- It has been approximately three years since EPA has visited/inspected the shipyard. The LA DEQ has conducted site inspections and did so for EPA before receiving primacy of the NPDES program.
- There is a 12-year program to develop TMDLs for the Mississippi River. Background data for quantification of various parameters is presently being collected.

Atlantic Marine/Alabama Shipyard Mobile, AL

- Considerable changes in stormwater management have occurred in recent years. Many BMPs employed and outlined in the SWP_3. Running street sweepers through the yard on a frequent basis is one BMP that has been reported to work well. They tried using filter fabrics in stormwater drains, but have discontinued this effort. There are no immediate plans to collect, treat, or reuse stormwater. A preconstruction blast house has allowed "most everything" to be moved indoors. Rip-rap around drains has been added where feasible, vehicle maintenance has been moved indoors, drip pans are used extensively, and used grit stored outdoors has been moved onto a bermed concrete pad.
- Efforts currently being conducted to control stormwater include welding flat bar around the drydock that when combined with maintaining a trim on the dock will channel flow to point where it will be collected in a sump and then pumped to a holding tank. This effort is voluntary and part of a transition to hydroblasting. They are considering sending this water to a POTW.
- The Alabama Dept. of Environmental Management (ADEM) is the NPDES permitting authority. There are no local stormwater regulations. The shipyard currently holds an individual permit but has filed for a general permit. From feedback from the state, no changes in the permit parameters will occur. Monitoring will be semi-annually except for the drydock which will be weekly because of hydroblast-generated water. Current parameters include: flow, pH, O&G, COD, total recoverable copper, zinc, lead, iron, aluminum, and tin, and TSS.
- In an effort to minimize metals mobilization with stormwater runoff zinc anodes have been moved indoors. Zinc-primered, pre-construction steel is stored outdoors. There are no metals limits.
- Good relations with regulators is fostered through regular contacts (approx. monthly phone calls). ADEM conducts inspections of the shipyard annually. There are no changes anticipated in the immediate future with regard to stormwater permit requirements. It was mentioned that sediment quality, which the state is studying, may impact the shipyards.
- Alabama is in the early stages of developing TMDLs for the Mobile River and Mobile Bay. Studies of these systems and the watershed are being conducted under the National Estuary Program, which is funded by the EPA. On March 5, 1998 the EPA proposed to upgrade nine stream segments in Alabama from their current designation of "Agricultural and Industrial Water Supply" including the lower Mobile River. If this occurs, the effect will likely be more stringent permit limitations to dischargers on these waterways.

- No stormwater effluent toxicity studies have been required. No stormwater monitoring requirements are imposed for areas in shipyard where "boat building and repair activities are not exposed to stormwater (i.e. conducted in a totally enclosed area)."
- ALM/ALD participates in a Gulf-Coast shipyard association (Shipyard Association for Environmental Responsibility, SAFER) that addresses and discusses with regulators issues concerning stormwater.

National Steel and Shipbuilding Co. (NASSCO) San Diego, CA

- Most fabrication occurs outdoors due to favorable climate.
- NASSCO holds a shipyard general permit issued by the California Regional Water Quality Control Board (RWQCB), San Diego Region. It previously held an individual industrial permit. A new permit issued Oct. 15, 1997 has been challenged and is under review; the shipyards in San Diego have collectively challenged this permit. (NASSCO negotiated for three years on this permit and "didn't get anywhere.") A stay was denied by the RWQCB and an appeal at the time of the shipyard visit was under review in state court. The permit will be reissued after court review. The permit as written would "open the door" for third party (public) lawsuits. Toxicity requirements for stormwater were also included in the new permit and not the old. No dilution is allowed in toxicity testing. The new permit also increases the amount of runoff that must be collected from high risk areas from the current 0.1 inch to 0.25 inch.
- Increased monitoring requirements under the new permit would bring monitoring costs to >$200,000 annually and meeting other provisions of the permit would require an estimated $3.5 to $5 million dollar upgrade.
- The RWQCB permit writer is also the permit inspector and a poor relationship has developed due to the challenge of the new permit. The San Diego RWQCB appears to be understaffed
- A permit requirement not seen in most shipyard permits is the requirement to monitor sediment quality semi-annually at 17 sites adjacent to the shipyard; other bayside industries have similar requirements.
- The following parameters have limits set in the permit: oil and grease, settleable solids, turbidity, pH, and temperature.
- The RWQCB has developed a Water Quality Control Plan for the San Diego watershed. The RWQCB and state are pushing watershed management. The bay waters and sediments have been and are being studied and TMDLs for copper, zinc, and PAHs are probably a couple of years away. Sediments have been characterized as widely contaminated with copper and mercury. It was suggested that widespread sediment monitoring will be incorporated into NPDES permits nationally as soon as EPA develops sediment standards.
- An extensive number of BMPs are incorporated into the operations at the shipyard. In high oil and grease areas, covers are kept on storm drains to prevent spills from entering the stormwater collection system. An outdoor small parts painting area drains to a sump and is pumped to the on-site wastewater treatment plant. High risk areas are bermed and

water is collected and sent to the on-site oily-water wastewater treatment plant. A steel mesh to collect large particulate matter is installed in all storm drains as required by permit. Housekeeping is an important part of the SWP_3 plan. Many areas of the yard are broom cleaned daily and certain roadway areas are cleaned nightly. All employees receive BMP training including discussion in 5-minute meetings at the beginning of a shift. Managers receive NPDES permit training.

- Currently the floating drydock is being lengthened and will be bermed and troughed so that water will be collected off the deck and sent to the oily-water wastewater treatment plant. The oily water treatment plant treats both process water and stormwater. It is treated in batch mode and then discharged to the collection system of a San Diego POTW.

Southwest Marine, Inc. San Diego, CA

- Land area is 10.4 acres and the perimeter of the yard is bermed so that no stormwater runoff escapes collection. On the pier storm drains are closed and water evaporates or is removed by a "vacuum" truck. In high-risk (hazardous material) areas 100% of stormwater runoff is collected and then discharged to the regional POTW collection system. In other areas of the yard, 0.1 inch of each rainstorm is collected and discharged to the local POTW. They will be expanding the capacity to collect stormwater and will collect the first 0.25 inch of a rainstorm in the future.
- Stormwater that falls on the Pride of San Diego drydock (as well as hydroblast water) is collected in an on-site baker tank and then transferred to the POTW collection system; a tank in the drydock wing wall is also used if the baker tank volume reaches capacity. On the second drydock (the AFDL) a small collection tank pumped by a tanker truck is used when industrial activity (ship work) is occurring in the dock. No recycling or reuse of stormwater occurs or is planned.
- By discharging to the local POTW this water is diverted away from the bay since POTW discharges are off shore in the Pacific Ocean.
- Adsorbent pads placed below the storm grates are used to "treat" the first flush of water. These are replaced after each storm or during a storm if water backs up due to clogging.
- A general industrial permit is held by the shipyard. Requirements under this permit are nearly identical to NASSCO's permit. However, they only sample and analyze if they discharge to the bay; not all rainfall events result in discharge to the bay. Sediment sampling in the Bay is required at 8 sites. No dilution or mixing zone is allowed for considering impacts to the bay. Semi-annual inspection occurs.
- It was indicated that shipyard management placed a high priority on environmental matters. The position of SWM is to work with regulators. A good relationship exists with the inspector.
- Collectively working with other shipyards on stormwater and other environmental issues.
- Some of the BMPs utilized include: new employee training, general housekeeping, lids on dumpsters to prevent sea gull redistribution of trash as well as many others listed in the SWP_3.

- Cascade General concentrates on ship repair and rehabilitation and also conversions; oil tankers are a major portion of the work. One to five cruise ships are in the yard per year for hull painting with TBT paint. Oil tankers use a copper-based, antifoulant paint.
- The CG shipyard has 149 storm drains and 9 outfalls. It is predominately paved and covers 94 acres. The drydock is separately permitted from the remainder of the shipyard. Drydock stormwater has discharge limits and has to undergo treatment while the rest of the shipyard has no numeric limits and treatment is not required of this stormwater. The following limits are required for drydock waters.

Parameters	Limitations	
	Monthly Average	Daily Maximum
PH	--	Range of 6 to 9
Oil and Grease	8 mg/L	10 mg/L
Total Suspended Solids (TSS)	8 mg/L	10 mg/L
Copper	0.8 mg/L	1.0 mg/L
Lead	0.8 mg/L	1.0 mg/L
Zinc	0.8 mg/L	1.0 mg/L

- There are collection systems on the three drydocks that are used when a ship is in drydock (per NPDES permit requirements). Water collected off of the drydocks is pumped to a one-million gallon tank where it resides until it is processed through the on-site treatment plant. Treated water is discharged to the Willamette River.
- The NPDES permitting agency is the Oregon Department of Environmental Quality (ODEQ). ODEQ has limited resources and does not conduct inspections; inspections are handled locally by the City of Portland. Reporting is directly to ODEQ. Regulator relations were described as good. The ODEQ allows use of a mixing zone and dilution in calculations to set limits for the treated drydock water. Mixing zone calculations are in the permit and are based on 7Q10 Willamette River flow and dilution calculations based on lead discharges.
- There is currently no plan to recycle or reuse stormwater at the shipyard but this would likely change if the shipyard lost the rights to withdraw water from the Willamette River for process water.
- Some stormwater from the shipyard can go directly to the city's combined sewer system. Most of the discharges go directly to the river. Stormwater or process water from the drydock may be discharged to the city collection system but analysis must first be conducted and permission from the POTW must be obtained before discharge is allowed. A fueling area has stormwater collected separately from other locations. It is stored in a 500-gallon tank and then pumped to a tanker truck for transfer to a ballast water treatment plant.
- The Willamette River has been recommended for designation as an American heritage river. As part of the EPA "*National Sediment Quality Survey*", sediments have been

collected and analyzed in the Willamette River. A watershed approach to managing water quality has developed and the Willamette River Basin Task Force is studying water quality problems in the river.

- Three threatened or endangered species in the Willamette River were identified: steelhead, coho and chinook salmon.
- There is no whole-effluent toxicity (WET) testing at the shipyard or any other industry in this area of Oregon.
- A number of BMPs are employed including ones commonly found at other yards; a new SWP_3 is under development. Good housekeeping including frequent sweeping is employed as well as storm drain adsorbent pad inserts, new employee, subcontractor, and supervisor BMP training/education, covered waste areas, and grit stored in covered drop boxes located on the piers.

Todd Pacific Shipyard Seattle, WA

- Todd Pacific Shipyard work is typically dominated by commercial vessels. There is typically one US Navy ship per year serviced.
- The shipyard is 90% paved (approximately 26 acres) and stormwater discharges enter Elliot Bay/Suwamish River. Two outfalls are required to be monitored by monthly sampling. There are three parameters with NPDES effluent stormwater limits; oil and grease with a 10 mg/L avg. monthly value and a 15 mg/L daily maximum, turbidity with a maximum daily limit of 5 NTU above background at the edge of the chronic mixing zone, and a maximum daily limit of 45 mg/L for TSS. There are requirements of photographic evidence of discharges in the NPDES permit.
- The permitting authority is the Washington Department of Ecology.
- Acute toxicity testing for waters from the drydock is required by NPDES permit on a semi-annual basis. One acute toxicity test conducted right after a coating of TBT paint was applied to ship resulted in a failure; the TBT concentration was reported as 0.1 ug/L. TBT monitoring is required only for the drydock. The Washington Dept. of Natural Resources has pushed for TBT monitoring requirement the same as for metals and regular sediment monitoring also within the NPDES permit. Harbor Island (the location of the shipyard) is on the National Priorities List (NPL). Todd Pacific must demonstrate that BMPs are in place and adequate control of contaminants will occur prior to sediment remediation (i.e. removal).
- A 200 ft. mixing zone is allowed. Reference conditions are outside the 200 ft. zone.
- Stormwater on drydocks is collected and transferred to an onshore tank where the water can be filtered through a diatomaceous filter (to remove particulate metals) before eventually discharging to the King County POTW. Water samples from the drydock are analyzed quarterly as part of the King County industrial wastewater permit. This water is typically process water and not stormwater.
- To minimize stormwater runoff from the shipyard a plan is being contemplated where water draining from roofs will be discharged to the sanitary sewers. This plan has not yet been discussed with the King Counter wastewater authority.

- The shipyard has a good working, non-adversarial relationship with regulators. It was reported that state regulators are starting to focus on the Port of Seattle. It was reported that regulators do not appear to be focusing on controlling NPS or municipal stormwater inputs yet. An EPA sediment study is ongoing in the receiving waters near the shipyard.
- It is anticipated that lower limits on monitored parameters may occur in the near future as well as and new limits placed on trace metals. The shipyard was required as part of their discharge permit to conduct an AKART study (all known, available, and reasonable methods of treatment) for the treatment of stormwater. After implementing treatment it is stated in the permit that "the Permittee may be granted a mixing zone for copper, lead, and zinc .." A filtration pilot study supported by NSRP was connected to this effort.
- Storm drains have inserts with adsorbent pads. Facilities department is responsible for cleaning out sediment and changing out adsorbent pads (monthly basis).
- Both new employee and on-going training is provided to shipyard workers with regard to proper environmental procedures. A number of BMPs consistent with other shipyards are also practiced.

Puget Sound Naval Shipyard Bremerton, WA

- USEPA is the NPDES permitting agency. EPA tried to transfer NPDES authority to the WA Dept. of Ecology but the State declined to accept the transfer apparently due to a shortage of resources. EPA to handle the permit indefinitely. It was indicated that Federal facilities still have sovereign immunity for water programs although this may change with a bill pending in Congress.
- There are five "industrial" outfalls, four drydock outfalls and one steam plant outfall. The non-industrial outfalls have no limits (they were monitored for two years, no required monitoring the past three years). The shipyard has considered treatment systems placed within the collection system/discharge pipe (below ground) but this would be difficult due to tidal swings.
- Receiving water for discharges in Sinclair Inlet of Puget Sound.
- The drydock discharges have limits for oil and grease (10 and 15 mg/L, monthly avg and daily max., respectively) and total recoverable copper (0.019 and 0.033 mg Cu/L, monthly avg and daily max., respectively). Copper also has loading limits; 0.44 and 0.77 lb Cu/day monthly avg. and daily max. for three outfalls and 0.83 and 1.44 lb Cu/day monthly avg. and daily max for fourth outfall (Drydock #6).
- Whole effluent toxicity (WET) data were submitted with the last permit application. There are currently No WET permit requirements.
- The shipyard does not currently, nor does it plan in the future, to recycle or reuse stormwater. The shipyard uses an ultra-high pressure hydroblast (with collection and recycle of water) for paint removal on hulls. The high pressure blast raises the temperature of the metal resulting in water evaporation. This effect allows painting to be conducted immediately after completion of blasting.
- Contaminated sediments were described as the primary issue for the shipyard. The State of Washington has developed sediment standards and it is believed that the sediment standards may be used in setting TMDLs. It was believed that some TMDLs have been

established for waters in the state. Local environmental groups have been more focused on water quality in receiving waters.

- An SWP_3 has been developed and thirteen BMPs have been implemented. Training of supervisors is an important component.
- PSNS is currently participating in a pilot-study of stormwater treatment. A continuous deflection separation system (vortex) manufactured by CDS is to be evaluated for contaminant removal. As part of this study, PSNS will evaluate various media for filter/sorption removal of contaminants.
- A technical report on available treatment technologies and equipment for stormwater/bilgewater/process water is being completed for PSNS.
- PSNS has secured an EPA Reinvention Program initiative under Project XL (Environmental E**x**cellence and **L**eadership) that will allow them to develop with the input of the stakeholders of the region, a plant to manage efforts to "improve water quality, sediment quality, biological health, and biodiversity within the [Sinclair] inlet ecosystem." This effort can provide greater regulatory flexibility and as proposed by PSNS would save at least $135,000 annually in NPDES compliance costs. (For more information see: http://yosemite.epa.gov/x/xl_home.nsf/all/psns.html . Under this program the shipyard will be a catalyst to bring stakeholders together to study the watershed and waters, to see what problems exist, potential threats to water quality, and then to develop TMDLs for the watershed.

Bath Iron Works Bath, ME

- EPA has NPDES permitting authority. Maine is trying to obtain authority from EPA to manage the NPDES program. BIW shifted from a baseline general permit to a multi-sector general permit in October 1996. Six outfalls sampled/monitored. Since switching to the MSGP sampling has changed from semi-annually (2/yr) to quarterly (4/yr) but no chemical analysis is required under MSGP, only qualitative evaluation. Under the general permit, WET testing was conducted for stormwater and also "full" chemical testing. There were many failures for water flea and brook trout. It was reported that EPA has never inspected the facilities for stormwater compliance.
- EPA is permitting by watershed now.
- Receiving water is the Kennebec River. No problems with water or sediment quality in the river in the vicinity of the shipyard. There is not intent to recycle or reuse stormwater in the near future. Maine has been concentrating on water quality as affected by construction and agricultural activities. Two stormwater drains are connected to the local POTW collection system. Some roof drains also discharge to this collection system. Other roof drains connect directly to the stormwater collection system so that roof runoff does not contribute to runoff from land surface and increase contaminant mobilization.
- Many of the shipyards environmental activities go beyond the minimum required by regulations. This is in part due to positioning BIW where future regulations are likely to be and also due to political and social pressure for BIW, Maine's largest employer, to be a leader in environmental practices.

- A number of BMPs have been developed. Wherever possible outdoors, activities that contribute contaminants to the environment are "tented in." When blasting or painting ship hulls, plastic sheets are used to isolate the section of the hull; plastic is wrapped around to cover the floor also. After blasting, the area is vacuumed before painting commences. Currently can't cover the bow area of ships. BIW is working with Spider Staging to develop a method to encapsulate this region of ships also.
- There are no additional state or local requirements for stormwater. Relations with EPA were reported to be good. Many verbal communications and agreements have been made with EPA on interpretations of various provisions of governing regulations.
- There is an endangered species, short-nosed sturgeon in the Kennebec River. It appears to prefer to hang around the ships. As part of the MSGP permit holders have to certify that stormwater is not likely and will not likely affect endangered species. A new land level facility adjacent to the river is being developed. Stormwater drainage in this new area will be captured and processed through a Vortechnics© treatment. The system is being designed to collect and treat the first 0.5 inches of a storm and then by-pass any additional runoff.
- One possible source of zinc in the shipyard is the practice of grinding zinc primer off of metal before welding. Although there is no technical reason for this practice (the primer is burn through primer) it is a requirement apparently negotiated with one (or more) of the shipyard workers unions.
- Some of the BMPs employed include secondary containment drip pans, biweekly audits of BMPs, covered storage for waste products (e.g. turning from milling), plastic lids for 55-gallon drums (prevents water from accumulating below the lip), and annual catch basin clean out.

Appendix B:

Shipyard Stormwater Survey

Questionnaire for the National Shipbuilding Research Program Project: Stormwater Collection, Treatment, Recycling and Reuse in a Shipyard

1. Does your facility have a NPDES permit? __ yes __ no

2. Does this permit include stormwater discharges? __ yes __ no

3. If not, have you submitted a Notice of Intent (NOI)? __ yes __ no __ not sure

4. If yes to question 1, does a __ state authority, or the __ USEPA issue your NPDES permit? If a state authority, which state agency issues the permit.
_____

5. How many stormwater discharge points (outfalls) does your facility have?
__ none, __ 1-5, __ 5-10, __ 10-20, __ > 20

6. Does any of your stormwater discharge to a municipal storm water sewer or a municipal combined sewer system? __ yes __ no

7. Does your facility recycle or reuse stormwater? __ yes __ no. If yes, how is stormwater used _____
_____

8. Does your facility employ any structural BMPs (e.g. ponds, hay bales, etc.) to control storm-water? Please indicate which are used and where.
_____
_____
_____

9. Does your facility have a stormwater management plan? __ yes __ no

10. What type of stormwater sampling is your facility required to perform, if any?
__ none __ grab __ composite __ other

11. What parameters do you have discharge limits for in your permit pertaining to stormwater?
_____
_____

12. What parameters are you required to monitor for in stormwater but for which you do not have limits?
_____
_____

13. Is your facility required to submit a Discharge Monitoring Report (DMR) __ yes __ no

14. Is whole effluent toxicity (WET) testing required for stormwater? __ yes __ no

Return Date: March 27, 1998

At what frequency? _____

15. When does your current permit expire? _____

16. Does your facility employ any storm water treatment processes? __ yes __ no

17. If yes to question 16, what type of treatment is employed?
_____

18. If your facility treats storm water, is this required by the permitting authority to meet specific effluent limits __ yes __ no

19. The USEPA is promoting a watershed approach to improving and maintaining water quality in receiving waters which include "effluent trading?" Has your permitting authority adopted or does it appear to be planning on adopting this approach?
__ yes __ no

20. Has your permitting authority developed total maximum daily load (TMDL) values for the water to which your storm water discharges? __ yes __ no

21. If no to question 20, is there evidence that TMDL values are being planned/developed for your receiving water(s). __ yes __ no __ not aware of any effort

22. Are there any additional state or local stormwater regulations that the shipyard and related support industries are required to meet? __ yes __ no __ not sure

23. Please indicate the industrial activities or storage areas at your facility that are exposed and potentially contacted by stormwater.

ÿ pier operations	ÿ sandblasting/painting	ÿ scrap/waste materials including metals
ÿ welding	ÿ ship repair	ÿ vehicle washdown/steam cleaning
ÿ recycling facilities	ÿ dumpsters	ÿ fueling stations/fuel storage areas
ÿ marina	ÿ vehicle maintenance	ÿ chemical storage/transfer stations
ÿ batteries	ÿ solid waste transfer	ÿ hazardous waste accumulation areas
ÿ coal storage	ÿ portable toilets	ÿ vehicle maintenance areas
ÿ other _____	ÿ other _____	ÿ other _____

We appreciate your participation in this national survey which is being used to better prepare the shipbuilding/shiprepair industry for future national and state stormwater regulations. The results of

this survey will be freely circulated to participants of the survey and we wish to ensure that you receive a copy. Please fill in the information below so that we can provide you with a copy of the results.

Name/position _____

Address _____

_____

Telephone _____

Fax _____

email _____

Please return the questionnaire with the enclosed envelope to:

Mr. Larry Mizelle
Technical Director
CASRM, Inc.,
222 E. Main Street, Norfolk, VA 23510

Additional Comments:

_____

_____

_____

_____

_____

_____

Return Date: March 27, 1998

Stormwater Survey Results **March 1998**

Question **Composite Responses for 15 Shipyards that Responded to the Survey**

1	Yes =	15	No =	0		0		
2	Yes =	13	No =	1	NR =	0		NR = not reported
3	Yes =	2	No =	1	NS =	0		NS = not sure
4	State	12	EPA	2	NR =	0		NR = not reported
5	1 to 5	2	5 to 10	1	10 to 20	5	>20	7
6	Yes =	8	No =	7				
7	Yes =	1	No =	14	Recycle/Reuse - see page 2			
8	Yes =	10	No =	4	BMPs - see page 2			
9	Yes =	13	No =	2				
10	none	0	grab	14	composite	3	other	0
11	Discharge Parameters - see page 3							
12	Monitor for - see page 3							
13	Yes =	14	No =	1				
14	Yes =	5	No =	9	Frequency = typically annual			
15	Expire	variable						
16	Yes =	3	No =	12				
17	Treatment = see page 4							
18	Yes =	2	No =	1				
19	Yes =	3	No =	11				
20	Yes =	4	No =	10				
21	Yes =	7	No =	1				
22	Yes =	3	No =	9	NS =	3		NS = not sure

23	pier	13	sand/paint	14	wast matl	12
	weld	13	ship repr	14	vehl wash	8
	recycle	4	dumpst	13	fuel statns	11
	marina	0	veh. maint	11	chem stor	9
	batteries	2	sld wst tr	8	haz waste	10
	coal stor.	1	port. toil.	7	veh main	11

Question 7: Stormwater Recyled/Reused

1	no
2	no
3	no
4	no
5	no
6	no
7	drydock stormwater is collected and used to reduce TSS from process
8	no
9	no
10	no
11	no
12	no
13	no
14	no
15	no

Question 8: Structural BMPs Used

1	SW Diversion, berms
2	Catch Basin Inserts with Fabric Filters
3	none
4	straw, haybales around drains
5	none
6	hay bales
7	none
8	none
9	none
10	adsorbent booms on drydock
11	none
12	SW diversion to catch first flush in high-risk areas for treatment then discharge to sewer
13	75% routed via storm drain system to
14	pave areas to minimize erosion, 90% of the yard is impervious, pervious surfaces = low sloped and covered with crushed stone to prevent erosion and allow infiltration
15	containment booms, emissions prevention, etc.

Question 11: Parameters for Which Discharge Limits are Incorporated in the Permit

1 none
2 TSS, Turbidity, O&G, heavy metals
3 none
4 none
5 O&G, COD, TSS, Phosphorus, Nitrogen, copper, lead, zinc, aquatic toxicity
6 none
7 lead, zinc, copper, pH, fecal coliform
8 none
9 O&G,COD, zinc, pH, TOC
10 pH, O&G, COD, copper, tin, iron, zinc, lead, chromium, TSS
11 pH
12 toxicity (acute & chronic), 90% survival 50% of the time, no less than 70% survival 10% of the time
13 none
14 none
15 pH, conductivity, O&G, TSS, ammonia, cadmium, chromium, copper, nickel, lead, zinc, mercury, barium, silver

Question 12: Parameters for Which Monitoring Only is Required (No Discharge Limit)

1 none
2 heavy metals yet to be determined
3 BOD, TSS, COD, pH, recoverable metals, petroleum hydrocarbons, cyanide, semi-volatile organics
4 dissolved copper, lead, zinc, nickel, TSS, O&G, toxicity
5 Chrome, tin, nickel, phenol, TRC, MBAS, TDS, Tot settleable solids, silver, aluminum, Mn, Fe, fecal coliform
6 pesticides, PCBs, base neutrals, volatiles, acids
7 none
8 clarity, suspended solids, film
9 cadmium, chromium, copper, tin, lead
10 all but O&G
11 flow, TSS, COD, O&G
12 metals, O&G, settleable solids, turbidity, temperature, TSS, pH, flow, TBT, PAHs, total residual chlorine
13 flow, O&G, COD, pH, TSS, Zn, Cu, Cd, Al, lead, nickel, antimony
14 flow, O&G, COD, TSS, pH, Tot. rec. cadmium, chromium, copper, lead, selenium, nickel, silver, zinc, and total dissolved hexavalent chromium
15 none

Question 15: Year in Which Permit Expires

1	2002
2	2001
3	1999
4	1999
5	2002
6	1999
7	2000
8	2000
9	indefinite
10	1999
11	not reported
12	2002
13	2001
14	2001
15	1998

Question 17: Stormwater Treatment Processes Employed

1	none
2	none
3	none
4	none
5	none
6	none
7	drydock stormwater collection and treatment
8	none
9	none
10	none
11	none
12	oils and metal removal
13	none
14	drydock dam & baffle system to control solids, basin sediment traps to control solids.
15	none

Locations of Shipyards Responding

1	CA	San Diego
2	WA	Seattle
3	WA	Bremerton
4	VA	Norfolk
5	CT	Groton
6	VA	Norfolk
7	OR	Portland
8	ME	Bath
9	LA	Avondale
10	AL	Mobile
11	MS	Pascagoula
12	CA	San Diego
13	FL	Jacksonville
14	VA	Newport News
15	CA	San Francisco

Appendix C:

Stormwater Regulatory Information Collected from States

Discussions with State Representatives

Representatives from the permitting authority for each of 10 coastal states with shipbuilding and repair industries were recently contacted regarding current and future plans for managing and controlling stormwater. The representatives ranged in responsibility from permit writers of general and industry-specific permits to agency heads. There does not seem to be any consistent approach to the management of control of stormwater, except in the case where the states were not delegated NPDES authority (Maine and Florida). USEPA NPDES permits for those states included the requirement for developing and implementing a Pollution Prevention Plan that relied heavily on Best Management Practices (BMP) and required very little monitoring. In the case of states that have been delegated NPDES authority, monitoring of stormwater effluent could include any one or all of the following: 1) visual inspection of stormwater effluent; 2) monitoring of conventional or priority pollutant contaminants; 3) whole effluent toxicity (WET) testing; and/or 4) contaminant-specific monitoring for compliance with numerical contaminant concentration limits.

Significant comments provided by contacts from the 10 coastal states are summarized later in this section. In those discussions, several programs were identified that suggest routes for increased regulatory attention being given to stormwater issues at shipyards. These programs are discussed in the following paragraphs, but it is important to note that the states will act on these programs to the extent that their states will allocate the necessary resources and their effectiveness will be based on the extent that their staff are trained and experienced in these topics. Because of differences in strategies and resources, regulatory programs and their enforcement will always be different between the states and this is especially true for the shipbuilding and repair industry.

In nearly all coastal states with shipbuilding and repair industries, the local waterbody has been listed as impaired or threatened under section 303(d) of the CWA. However, not all shipyards in every state fall in a watershed that has been listed. Several shipyards in Virginia are located on the Elizabeth River, a waterbody that has been listed as impaired, but a major shipbuilding and repair industry is located on the James River in a reach that is not listed as impaired. It is likely that many of the waterbodies nationwide listed as impaired under section 303(d) should be listed as a “high priority to receive accelerated attention.” Although the representatives from most states indicated this is probably true, they admitted that the guidance for the development of total maximum daily loads (TMDL) is inadequate (in their opinion) and the process of completing a TMDL for a high priority waterbody within 5 years or less may be unrealistically optimistic.

It is unlikely that there will be any new regulations or management programs for stormwater (controls, water and sediment quality) initiated by the individual states that will be applied to shipyards in the near future beyond the TMDL process. That is, almost all agencies seem to be directing their available resources to completing the 303(d) listing process and organizing internal staffing teams to begin the development of TMDLs. Most representatives stated that their agencies would be following the lead and, in some cases, pressure from USEPA before attempting to independently devise new control or management initiatives.

It was suggested by more than one contact that to the extent that any guidance from USEPA regarding implementation of the Clean Water Action Plan would occur it would likely lead to improved coordination and cooperation between all agencies (within states) that have an interest in stormwater or other release and loading of contaminants. This may not lead to a consolidated permit in all cases, but in most cases would certainly improve the planning and coordination between regulatory and enforcement offices.

In several states, the option of pumping stormwater to POTWs has been considered. This idea has some support in areas where freshwater is needed by the POTWs for their biological wastewater treatment process and not supported in areas where freshwater is abundant. However, as more stringent effluent limits are applied to POTWs and when the TMDLs are implemented, it is unlikely that any POTW will want to receive industrial wastewater or stormwater that cause exceedences of their NPDES permit limits. In the near future, it is likely that any influent permits or limitations issued by POTWs for industrial wastewater will be as restrictive as effluent limits to surface waters.

Recently, USEPA identified a management strategy for persistent, bioaccumulative and toxic (PBT) substances using mercury as the first case and this is likely to have an impact on the coal fired energy industry. Eleven other compounds are on the first list and some of these compounds may be found in industrial wastewater and stormwater from shipyards. Given that there is a global concern for the presence of tributyl tin (TBT) in the environment, this compound could be added to the list for industry-wide and application-wide controls on the same scale as mercury is being addressed. Although shipyards are not the only source of TBT entering the environment, it could be targeted much like the coal-fired energy industry is for mercury releases.

Most of the current and planned regulatory programs affecting shipyards are a result of legislation in response to a perceived or real problem that had overwhelming support or concern expressed by the public at large. As more of the public, also known as stakeholders, become more aware of environmental problems in their regions, there will be more pressure on the States' legislative bodies to develop and enforce new environmental controls. The citizen law suits have only begun. With the current Federal initiative for Community Right-to-Know and greater distribution and access to environmental data on the Internet, stakeholder groups will continue to form and press for greater controls and more stringent application of current regulations. Since the stakeholders are going to be drawn into the TMDL process, it will be easy to see the impact of this on the regulatory climate very soon. Public pressure could result in more stringent surface water quality standards or standards for new substances being adopted. This is especially likely where traditional regulatory programs do not prevent impairment of the habitat because of: 1) a reluctance by industries at large to be good stewards of the environment; 2) ineffective existing regulatory programs; and 3) historical problems that have never been addressed. At least one northwestern state will be dealing with the latter problem when (or if) specific salmonid species are placed on the Endangered Species List.

The following section is a summary of the recent discussions with representatives of state regulatory or resource management agencies concerning current and future plans regarding stormwater management and control.

ALABAMA

Are stormwater discharges or outfalls regulated under the State's NPDES program?

Yes.

What parameters are monitored at shipyard stormwater outfalls (in general)?

Metals and organic contaminants are monitored in stormwater effluent. Whole effluent toxicity (WET) tests are currently not required. Although contaminants are monitored at stormwater outfalls, most do not have permit limits for other than conventional pollutants. Historical data are reviewed to determine if there is a need to investigate excursions from the historical concentrations. Some monitoring for total tin and paint chips is conducted at shipyards.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

There are no plans to make water quality standards (WQS) more stringent or to implement sediment quality standards (SQS).

EPA has identified a management strategy for PBT substances using mercury as the first case and this is likely to have an impact on the coal fired energy industry. Are there any plans to address the most likely source of TBT (i.e. shipyards) with more stringent discharge limitations and/or control measures? (PBT = persistent,bioaccumulative, and toxic)

No. Tributyl tin (TBT) has been banned except for military vessels.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

And

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

Shipyards are located in impaired waters listed under 303(d), however, it is not certain if any of these impaired waterbodies will be given high priority for total maximum daily loadings (TMDLs) to be implemented within the next five years.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

No

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

No. Permits generally disregard sheetflow and assume all runoff is directed to stormwater outfalls.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

No. However, in the future the nature and extent of foreign material in the sediments may be used to characterize the type of industry that may be responsible for co-occurring contaminants in the sediments. Some monitoring for total tin and paint chips is conducted at shipyards. A study performed in the '90s was to be used as a baseline for what was in the sediments and to be used to determine if BMPs were effective, however, dredging in the vicinity of the study has occurred making this evaluation difficult.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

To the extent that the nature of foreign materials in the sediments can be associated with specific industrial activity.

CALIFORNIA

Are stormwater discharges or outfalls regulated under the State's NPDES program?

Yes. Most industries will fall under general permits. However, in San Diego region (Debra Jayne 619-467-2972) there may be a general shipyard-specific permit in place.

What parameters are monitored at shipyard stormwater outfalls (in general)?

Contaminant (metals and organics) monitoring is required, but not WET. However, WET testing could be applied to a permit at any time if warranted.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

No current plans to make water quality standards more stringent.

EPA has identified a management strategy for PBT substances using mercury as the first case and this is likely to have an impact on the coal fired energy industry. Are there any plans to address the most likely source of TBT (i.e. shipyards) with more stringent discharge limitations and/or control measures? (PBT = persistent,bioaccumulative, and toxic)

No.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

The stormwater (and other) permitting programs are managed on a regional basis with 9 regions statewide. Each region has the responsibility for managing and controlling stormwater and may be responsible for contributing to the development of TMDLs within their regions.

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

Unknown

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

No.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

Not likely.

What engineered controls besides stormwater retention basins will be considered?

BMPs are the only method for controlling stormwater. There are no plans to make the stormwater program more stringent that the application of narrative standards to the utilization of BMPs. BMPs are used to address "sheetflow" but they are not required by the permits.

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

No, unless voluntary.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

No. To address contaminated in-place sediments, a lead agency would have to coordinate with all other relevant agencies to approach a potentially responsible source for remediation or restoration efforts. It is unlikely that there will be much attention to this problem because of CERCLA intervention when the problem is so large as to require attention. Greg Vaughn, Senior Engineer is dealing with this issue in the Port of Stockton (916-255-3142). There is a major controversy in this area and may involve a permit as a result of an enforcement action.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

No, not without a lead agency coordinating with all affected state and federal agencies.

FLORIDA

Are stormwater discharges or outfalls regulated under the State's NPDES program?

No, Florida does not have primacy for NPDES. However, Florida has been managing stormwater since 1982 under a state program. All new industrial activities since 1982 have been required to have a performance-based stormwater treatment program. All stormwater must be conveyed to the treatment process and along the way may encounter BMPs to further reduce the loads.

What parameters are monitored at shipyard stormwater outfalls (in general)?

No monitoring. The performance-based system is expected to provide adequate stormwater controls if properly implemented as defined by Florida.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

No. However, for the NPDES program, USEPA water quality criteria (WQC) apply and will be implemented when changed or modified. SQC may become a problem since the state does not have primacy. This could affect other states without primacy. It just depends upon how close USEPA can link contaminated sediments to the CWA through the regulatory process, but contaminated sediments can also be addressed through USEPA's and the States' hazardous waste programs.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

If located in Tampa Bay or the St. Johns River. There are approximately 700 waterbody segments statewide on the list of impaired waters.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

No.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

Not unless required by the USEPA NPDES permits.

Will pump and treat (at MWWTP or STP?) be considered an option where stormwater can be captured and channeled?

Pumping stormwater to a POTW is not an option in Florida.

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

No. The Florida permit requires most flow be directed to treatment processes.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

No because it is too difficult to determine linkages between source and presence of contaminated sediments in estuarine settings.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

Not likely.

Comment:

Florida has an established program for evaluating sediment quality but it is not used on a routine basis for addressing management of contaminated sediments.

LOUISIANA

Are stormwater discharges or outfalls regulated under the State's NPDES program?

The state was delegated NPDES permitting authority on August 26, 1996. The majority of shipyards fell under the old multisector permits (FR 09/25/95) and the state retains the right to make the permit requirements more stringent. Currently there is no monitoring of stormwater at these shipyards. When the new multisector permit guidance is provided by EPA (2000), they will probably require monitoring of the stormwater discharges.

What parameters are monitored at shipyard stormwater outfalls (in general)?

Currently there is no monitoring of stormwater at these shipyards.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

No. Louisiana will probably follow EPA's lead on WQCs and SQCs.

EPA has identified a management strategy for PBT substances using mercury as the first case and this is likely to have an impact on the coal fired energy industry. Are there any plans to address the most likely source of TBT (i.e. shipyards) with more stringent discharge limitations and/or control measures? (PBT = persistent,bioaccumulative, and toxic).

Not likely to happen for shipyards in Louisiana.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

Yes, probably all.

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

Not certain, but probably yes. The state has only recently hired the personnel to design and implement TMDLs. There will likely be a priority list of the listed waterbodies that will be placed on the "5 year" plan for implementation.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

Louisiana will follow whatever initiatives or regulations that EPA may develop. The state will not likely require any more additional measures.

Are there any non point source programs (Section 319 CWA) that may affect shipyards relating to the control and management of stormwater?

Unknown.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

Only those controls that may be implemented under the BMPs to enhance the prevention of solids and particulates from entering receiving waters will be considered. These will be very basic measures and not extensive in an engineering sense.

What engineered controls besides stormwater retention basins will be considered?

Not clear program at this time. A regional problem is that most shipyards are located near low areas and flooding of the basins that would disable any engineered control is a periodic problem.

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

No.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

The state does not currently consider the sediments to be the responsibility of the shipyard, however, they are aware of efforts by USEPA to define linkages between what is in the sediments and the potential sources. They will continue to follow USEPA's lead.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

The state will follow USEPA's lead.

Other comments:

The new multisector permit guidance may allow greater management controls over stormwater at the shipyards. Currently Pollution Prevention Plans (PPP) are drafted by the permittee and modified and/or approved by the state. If the permittee fails to do what is stated in the PPP, then they are in violation of their permit.

The control of stormwater as defined in the permit varies by permit writer. The state usually tells the shipyard what control measures it "should" have in the PPP and not what it "must" have.

MAINE

TMDL Status: Final list has been approved by USEPA.

Are stormwater discharges or outfalls regulated under the State's NPDES program?

No. EPA administers the NPDES program for the state. Stormwater discharges fall under multisector general permits. However, Maine is rapidly moving towards primacy and may be delegated NPDES permitting authority in 6 to 8 months (still pending). When this occurs, Maine will inherit the multisector general permits and it may be some time before any changes occur. The EPA NPDES permit requires only quarterly visual inspection and a PPP on file with EPA.

What parameters are monitored at shipyard stormwater outfalls (in general)?

Under USEPA NPDES permits, the stormwater monitoring consists of quarterly visual inspections only. No WET, no contaminant analyses. However, this could change when ME is delegated NPDES authority but may not change for some time. (For SIC 373 Ship and Boat Building and Repairing: FR Fri Sep 29, 1995, p 50992) [verified by USEPA Region 1].

There are only 3 shipyards in Maine and the NPDES permits cover 3 types of shipyard facilities: 1) floating drydocks; 2) graving docks; and 3) slipways. All three types are covered by BMPs developed by the shipyards and adopted almost without changes by the USEPA NPDES State Unit manager. There is no monitoring at floating drydocks or slipways for stormwater but suspended solids and oil & grease are monitored at graving docks. Since there is a physical containment system used at the graving docks, it is highly unlikely that any significant amount of material is released from these systems and the monitoring is only in the sump areas for those systems.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

When Maine is delegated NPDES authority, the state WQS could be more stringent than USEPA WQC, however, contaminant monitoring and WET is not required at this time.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

Yes, but the most probable cause is POTW with CSOs and not due to releases from shipyards. The State Unit manager suggested that in the waterbody reported under 303(d), there is a phenomenal flow rate and that dilution would probably eliminate any measurable levels of material released from the shipyards.

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

No.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) identified as impaired due to non point sources under section 319 of the CWA?

Yes, as indicated above.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

No or at least not until the State acquires primacy.

Are there any non point source programs (Section 319 CWA) that may affect shipyards relating to the control and management of stormwater?

Unknown.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

No. BMPs consist of keeping the site clean, not painting when the wind is prohibitive (active monitoring of wind speed is in place during painting operations), screens to contain dust/blast emissions and cleanup following blasting of hulls. The BMP programs are based in large part on a guidance document prepared by Carl Thomas (VA DEQ-TRO) and, according to the manager, is followed by a large number of states with shipyard facilities.

What engineered controls besides stormwater retention basins will be considered?

None.

Will pump and treat (at MWWTP or STP?) be considered an option where stormwater can be captured and channeled?

No. (MWWTP = municipal waste water treatment plant, STP = sewage treatment plant)

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

Not at this time.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

Unknown.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

Unknown.

MISSISSIPPI

Are stormwater discharges or outfalls regulated under the State's NPDES program?

Stormwater discharges in Mississippi are regulated under general permits and industry-specific permits issued to shipyards. Shipyards located on waterbodies that have not had impacts due to contaminants are covered under general permits and may be transitioned to multimedia permits in the future.

What parameters are monitored at shipyard stormwater outfalls (in general)?

No monitoring is required for general permits. The customary stormwater pollution prevention plan that identifies potential sources of contaminants and BMPs to prevent contact between runoff and industrial activities and products is required. Individual permits are issued to major shipyards and those located on impaired waters and require monitoring for contaminants in stormwater effluent. For shipyards and in areas under SARA Title III, effluents must be monitored for Form R contaminants. If those contaminants are found in high concentrations, the permits can be revoked/reissued with numerical effluent limits. Individual permits may see WET testing requirements in the future, especially if the receiving stream is impacted or impaired.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

There appear to be no plans to make water quality standards more stringent, except for the implementation of TMDLs in the near future and the development of sediment quality standards will be difficult due to the large variety of sediment types in the state. On the other hand, if current water quality standards are exceeded in a waterbody, new industrial or construction activities that represent potential sources of contamination are denied permits.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

And

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

The majority of the coastal waters with shipyard activity has been defined as impaired under the 303(d) listing. The state is going to use a basin approach with respect to the development of TMDLs, however, resources may limit how aggressive these efforts will be. As with most states, listing of waterbodies to receive a high priority for accelerated attention to

implement TMDLs does not seem to be the most important issue at the moment. Additional guidance from USEPA may change the attention given to high priority areas.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

No.

Will pump and treat be considered an option where stormwater can be captured or channeled?

Mississippi would prefer that stormwater receive pretreatment on site or that stormwater not be allowed to come in contact with potential sources of contaminants. Pumping stormwater to POTWs is frowned upon.

Are engineered controls used to capture and control all stormwater on a facility?

For at least one industry (non-shipyard), the NPDES permit that was issued requires that stormwater from the entire site be contained and receive pretreatment. This would not necessarily be as stringently applied to a general permit requiring only an identification of sources and appropriate BMPs.

OREGON

Are stormwater discharges or outfalls regulated under the State's NPDES program?

Yes. At least 5 shipyards are located in Coos Bay. These 5 shipyards are under the NPDES program but sediments contaminated by waste material from the shipyards are being addressed under Superfund and not the NPDES program.

What parameters are monitored at shipyard stormwater outfalls (in general)?

The shipyards are under a general permit now and there is no monitoring of discharges generated by stormwater. Oregon is working towards changing to multimedia permits (a single permit covering all media) and trying to get the shipyards to have "zero discharges." This involves using recirculating systems to trap, treat, and reuse the water. The solid residue would then have to disposed of through normal waste procedures. However, the solid waste may not be suitable for traditional land fill disposal options.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

The state is currently undergoing the triennial review of their water quality standards but it is unlikely that any standards for toxic substances will be changed. Oregon does rely on a narrative standard for assessing sediments that relates to a healthy and reproducing population of organisms. Apparently this sediment standard can be used when evidence indicates an impact. The recent listing of salmonids as endangered species will have little affect on coastal shipyards because the fish transit the area and the critical life stages occur much further upstream.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

Yes, but identifying the substances responsible for the listings and linking the substances to the shipyards will be difficult.

And

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

There are shipyards in coastal waters and the rivers that are on waterbodies that are listed as impaired. The state is taking a sub-basin approach and developing a priority listing for each.

The contact suggested that Oregon plans to have their TMDLs completed in eight years. Any efforts to developing TMDLs on an accelerated schedule will be hampered by limited State resources.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

The State is moving towards a multi-phase, zero discharge program rather than trying to control stormwater. That is, if you eliminate any opportunity for stormwater to come in contact with or mobilize waste material, you should not have to capture, contain or control stormwater as it should be relatively clean.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

The State's approach is that if the stormwater is clean, it will be unnecessary to control or manage it. [Except perhaps for flooding in specific areas.]

What engineered controls besides stormwater retention basins will be considered?

Not applicable.

Will pump and treat (at MWWTP, STP or POTW?) be considered an option where stormwater can be captured and channeled?

No.

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

No.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

The State is actively pursuing sediment cleanup at 5 shipyards in Coos Bay not based upon sediments being contaminated by stormwater under the NPDES program, but by holding the

companies responsible for hazardous waste releases to the environment. It seems that it is easier to go after the yards under Superfund than through the NPDES program or through benchmark values for toxic effects in sediments.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

See above.

TEXAS

Are stormwater discharges or outfalls regulated under the State's NPDES program?

From the Internet:

Texas was designated NPDES authority on September 14, 1998 and permitting under the TPDES will be administered by the Texas Natural Resource Conservation Commission (TNRCC). Existing EPA Region 6 NPDES permit files under the jurisdiction of TNRCC were transferred to the state including waste water and storm water point source discharge permits; the industrial pretreatment program; and sewage sludge disposal. EPA is temporarily maintaining EPA-issued storm water general permits for industrial and construction activity; EPA-issued storm water discharges from municipal separate storm sewer systems; and compliance assistance & enforcement for contested permits, storm water permits, and those with outstanding compliance issues.

From Direct Contact:

Texas has a Memorandum of Agreement with EPA Region 6 that allows EPA to continue administering existing shipyard permits (most are multisector permits) until they expire in the year 2000. Texas has reviewed the permits and they appear to comply with Texas' Administrative Rules (Code 319, Subchapter B).

What parameters are monitored at shipyard stormwater outfalls (in general)?

WET is not required, however, there is a list of toxic metals (Code 319, Subchapter B) that must be monitored for stormwater discharges to freshwater and marine waters. The list does not include TBT, but Texas is monitoring TBT at some facilities.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

No, except to the extent that as more information is collected, the analytes (metals) that will be monitored in stormwater may be modified to include more or fewer analytes. In some cases, permits have been tailored to require more specific analytes and drop others.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

And

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive

accelerated attention?

Some shipyards are located on waterbodies that have been listed, but the priorities have not been assigned.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

There is an effort underway to coordinate the expiration of permits from several Texas agencies leading to the issuance of a unified or consolidated permit. This consolidated permit would include all pathways that allow loading of contaminants into the receiving waterbody. It would include components for air, hazardous water, industrial wastewater, stormwater, etc.

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

According to EPA Region 6, all stormwater leaves facilities through a discharge point.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

Not at this time. However, in the state there has been a successful cleanup under the Industrial Wastewater Permit program and the contaminants in the sediments were successfully linked to the responsible party.

VIRGINIA

Are stormwater discharges or outfalls regulated under the State's NPDES program?

Virginia has been delegated NPDES authority and the state includes the control and management of stormwater discharges under existing permits to the shipbuilding and repair industries.

What parameters are monitored at shipyard stormwater outfalls?

Virginia seemed to have the most rigorous monitoring program consisting of conventional pollutants, contaminants that have established Virginia Surface Water Quality Standards, and whole effluent toxicity (WET) testing. In Virginia, floating drydocks (FDD) are treated as sources of stormwater and the effluent is monitored as if it was a confined, discrete source. Where tributyltin (TBT) paint is removed or applied to ships, it is one of the contaminants analyzed in the monitoring of the effluents.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

Virginia currently has no plans to make surface water quality standards (WQS) more stringent than existing standards, however, there may be modifications of the WQS under pressure from USEPA. That is, for example, the incorporation of translators from total recoverable metals data to dissolved metals concentrations as means to assess compliance with dissolved metals standards for ambient surface water. Sediment quality standards (SQS) have been under study for many years but no actions are anticipated. It should be noted that for SQS, when a problem exists it is usually addressed under the general narrative standard "no toxics in toxic amounts."

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

And

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

Several shipyards in Virginia are located on the Elizabeth River, a waterbody that has been listed as impaired, but a major shipbuilding and repair industry is located on the James River in a reach that is not listed as impaired. The Elizabeth River has received considerable attention by the state due to the efforts of a local stakeholder group and this may bring more attention to the need for a TMDL than if the River is listed as a "high priority to receive

accelerated attention." Virginia is awaiting guidance from USEPA for the development of total maximum daily loads (TMDL) and it is likely that the process of completing a TMDL for a high priority waterbody within 5 years or less may be unrealistically optimistic.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

No new initiatives are planned at this time, however, the agencies are awaiting guidance from USEPA regarding implementation of the Clean Water Action Plan. This would likely lead to improved coordination and cooperation between all agencies with an interest in stormwater or other release and loading of contaminants to the river. This may not lead to a consolidated permit but would certainly improve the planning and coordination between regulatory and enforcement offices.

Under Phase II of the multisector permit program, stormwater may receive greater attention for WET testing at shipyards. That is, even if industrial facilities apply for the proposed "no exposure" classification, it is likely that WET testing may be required to provide "proof" of no contaminant discharge through no exposure.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

Engineered controls are not expected to be required to meet regulatory compliance. One shipyard is experimenting with a stormwater treatment system designed to try to meet state TBT WQS. In Virginia, runoff from FDDs are treated as sources of stormwater and this proposed system would be used to reduce TBT prior to the release of runoff to the river. This is a voluntary program initiated by the shipyard.

What engineered controls besides stormwater retention basins will be considered?

None except for collection of stormwater from FDDs.

Will pump and treat be considered an option where stormwater can be captured and channeled?

No. Primarily because of the sewage treatment plant (STP) concerns for TBT effluent limits. The Virginia Surface WQS for TBT is a one part per trillion and, even with consideration for dilution in estuarine systems (traditionally, 50:1), this standard will be hard to meet due to the multitude of sources for TBT besides shipyard activities.

Is there (and will there be) any attempt to recognize, monitor, and control stormwater discharges that are not confined to a discharge pipe or outfall at shipyards or any other location in the watersheds?

No.

Does the existing stormwater program consider discharged sediments the responsibility of the shipyard (or adjacent land use activity - LUA)?

Not at this time.

WASHINGTON

Are stormwater discharges or outfalls regulated under the State's NPDES program?

There is a split permitting program for ship building and repair industries in Washington. "Boatyards" (businesses working on boats 85% of the time <65' or with 85% of the revenues from boats of this size) apply for coverage under a general NPDES permit. "Shipyards" (all other ship building and repair industries) are issued individual permits specifically tailored from a model permit. Both are required to monitor stormwater discharges.

What parameters are monitored at shipyard stormwater outfalls (in general)?

In general, boatyards have been required to monitor stormwater since 1992 for zinc, copper and total suspended solids. There has been no requirement for whole effluent toxicity (WET) tests. These data have been used to assess effectiveness of BMPs but the data are not necessarily of sufficient quality to make a confident assessment. The permits were reissued in 1997 and data collected over the next 5 years will be used to determine if the BMPs are or can be made to work effectively. If not, and if effluents exceed water quality standards, numerical effluent limits will be added to permits issued in 2002.

Shipyards are required to monitor for a full suite of contaminants and WET testing is required. The permits were crafted after a general engineering review of what BMPs would be practical and useful at a typical shipyard. Most shipyards are not meeting stormwater effluent limits and may be required to develop a treatment process to reduce exceedences of water quality standards. A candidate treatment process is an enhanced sand filtration system.

Are there any plans to make the WQSs and/or SQSs, where applicable, made more stringent in the near future?

No.

Are any shipyards located in watersheds where the waterbody has been (or will be in the future) listed as impaired (or non attaining) or threatened under section 303(d) of the CWA?

And

With respect to the 303(d) list, Are any of these waterbodies listed as a high priority to receive accelerated attention?

Some shipyards are located within waterbodies listed as impaired, but greater attention has been given to listing inland or freshwater areas than marine areas. The listing process may be greatly influenced by the desire to protect salmon populations with critical habitat requirements in freshwater regions of the state.

Besides TMDLs, are there any new regulations, management programs or initiatives for stormwater (controls, water and sediment quality) that will be applied to shipyards in the near future?

There are several issues that will be addressed in the coming years that could have an indirect impact on shipyards (and boatyards) beyond the TMDL. The customary practices at boatyards have not received as much attention as shipyards and this may change in the near future. Hull cleaning practices may be limited to specific techniques that capture all or nearly all of the spent abrasives and residues before the material can come in contact with the ground. These techniques could include vacuum sanding and those that rely on closed loop systems for recycling abrasives. Residues could be discharged to sanitary sewer systems but permitting and monitoring may be as aggressive as existing stormwater permits.

Additionally, employment of the Endangered Species Act to preserve, protect and restore salmonid populations coupled with citizen lawsuits may drive lawmakers to strengthen regulatory programs such as stormwater management and control.

Will engineered controls be used at shipyards in addition to BMPs to enhance management and control of stormwater?

No.

Will pump and treat be considered an option where stormwater can be captured and channeled?

There are some restrictions to pumping the stormwater to sewage treatment plants (STPs), but it is currently an option that is open to the industry. As STPs become more aware of their increased liability at their "end of pipe" discharges, this option may become severely restricted.

Will there be an attempt in the future to assign responsibility for sediment remediation and cleanup to adjacent LUAs?

Any location where the public would expect to see salmonids at some stage in their life cycle and where there is the suspicion that contaminants in sediments may be responsible will be a target for remediation. All potential sources could be evaluated as a responsible party. The regulatory approach to evaluating sources could be influenced by citizen lawsuits that take their action based upon the Clean Water Act, Clean Water Action Plan and/or the Endangered Species Act.